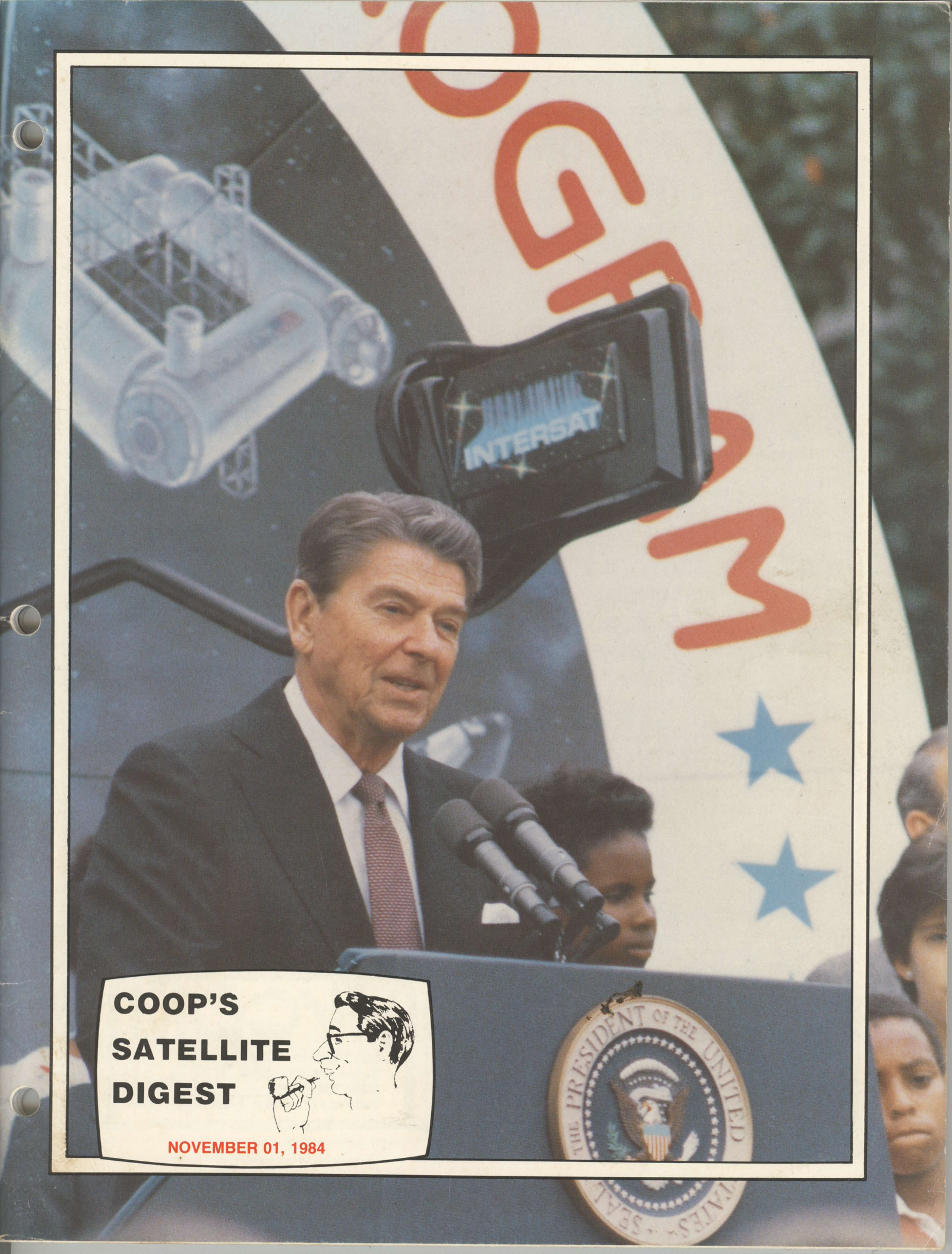


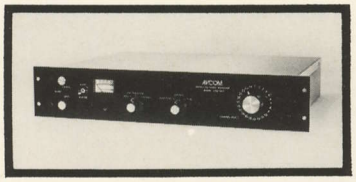
COOP'S SATELLITE DIGEST

NOVEMBER 01, 1984

AVCOM COMMERCIAL RECEIVERS

NEW! LOWER COST! MORE FEATURES

Win your next competitive bid!



COM-66TA
Fully Agile Tuning
Dual Horizontal/Vertical Inputs
Automatic Polarity Switching

CALL FOR SPECIAL QUANTITY PRICES!

Features Common to Both Systems:
Double Conversion
High Stability
Tunable Audio with Wide and Narrow Bandwidths

COM-65TA
Semi-Agile Tuning
Lowest Cost/Performance
Highest Reliability

PEOPLE ARE ASKING PEOPLE ARE ASKING

People are asking—Which block frequency format? AVCOM's 270-770 MHz or 950-1450 MHz?

- The 270-770 MHz block can be used with inexpensive cable TVRO distribution components.
- Lower feedline loss means lower feedline cost at 270-770.
- AVCOM's format is compatible with S.A.'s and Microdyne's.
- 270-770 MHz block allows simpler, more reliable construction for a given level of performance.

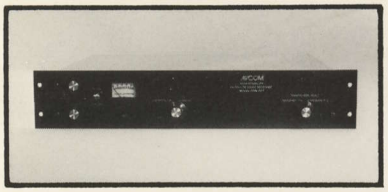
PEOPLE ARE ASKING PEOPLE ARE ASKING

PEOPLE ARE ASKING

PEOPLE ARE ASKING

HIGH STABILITY RECEIVER

COM-20



AVCOM's COM-20 High Stability Satellite Receiver is the answer for cable, private cable, radio stations, TV stations, BIZNET, and other dedicated applications. CAN BE FACTORY OR FIELD ADJUSTED TO A PARTICULAR TRANSPONDER AND WILL REMAIN ON FREQUENCY. Tunable Audio and Remote Downconverter normally supplied with COM-20. Numerous optional configurations are available, including fixed tuned audio, Internal downconverter, and downconverter switching for multi-channel capability.

AVCOM also has a complete parts and accessories warehouse and can fill your accessory needs FAST! AVCOM manufactures and stocks:

- Receivers
- LNAs
- Ferrite Isolators
- Power Dividers
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- Cable
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- Coax Seal
- Isolated Power Dividers

AVCOM

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Richmond, Va. 23236
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TOP OF THE MONTH

1977. It was spring and an interesting new 'product release' had come out of Microwave Associates; the predecessor to M/A-COM. They had a new device called a **Gunnplexer** which when properly configured could communicate with another Gunnplexer using a microwave frequency to distances up to five miles. Could it be adapted to TV? We cared because the whole device fit in the palm of your hand, antenna included! CSD looks at the latest generation of 'Videoplexer'™ in this issue; a fascinating transportable package allowing instant video and two-way audio communications between two points.

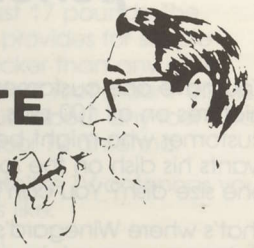
ACTIVITY in the eastern satellite belt is increasing and CSD has responded by 'launching' a new segment titled 'Scanning The Eastern Sky.' In our first lift-off, we look at 53 and 50 west and highlight a new US Information Agency 'World-net' program that could sell some terminals overseas.

INTERNAL wiring, or the art of creating sub-distribution systems for SMATV (or BDC as well) gets the nod for this month's installment dealing with SMATV techniques. You'll find out how to make single-source 'headend' signals spread out to cover multiple receiver locations; just like the big-time cable boys.

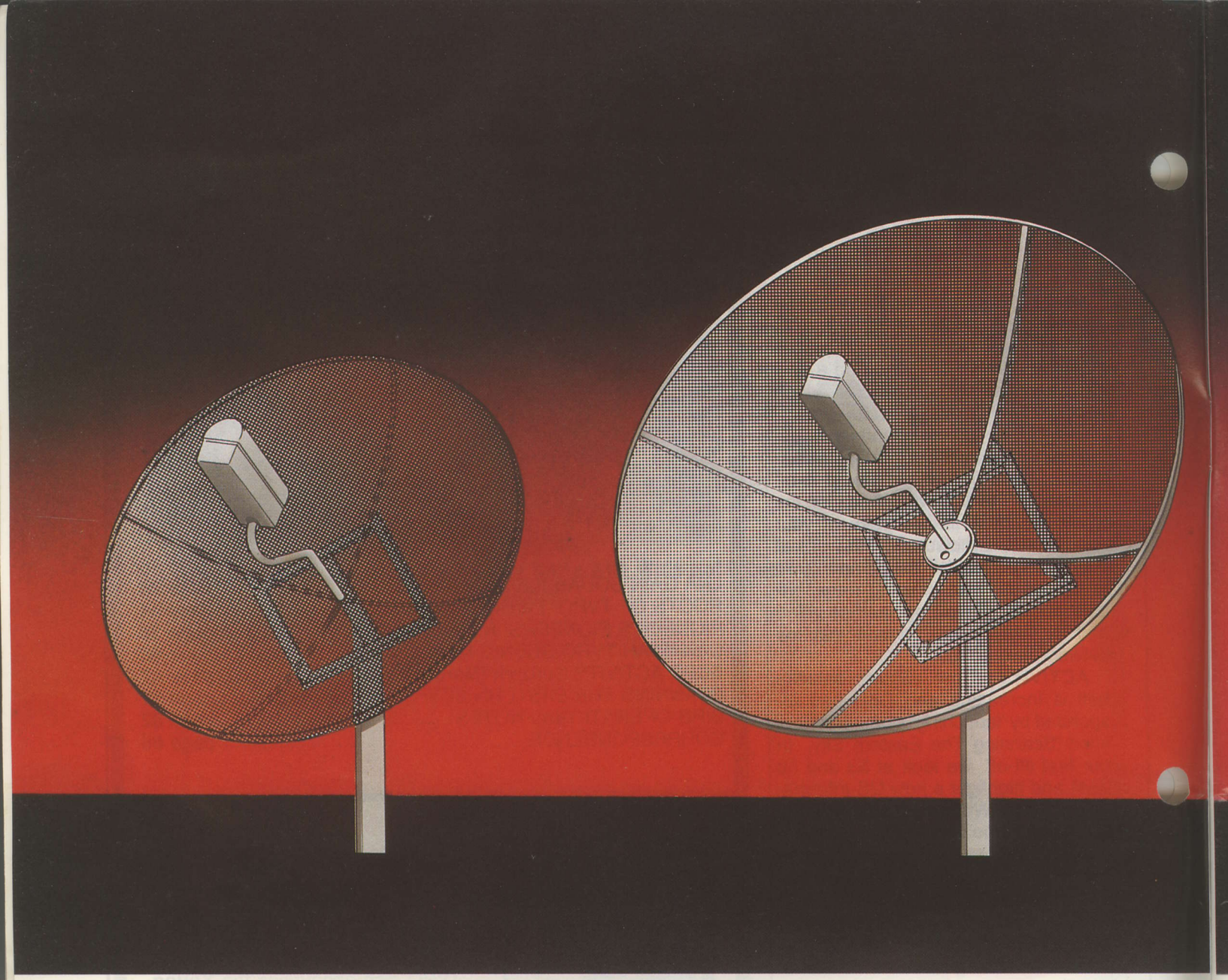
NOVEMBER 1984

OUR COVER/ United States **President Ronald Reagan,** on the South Lawn of the White House October 17th with 11 foot Intersat Challenger TVRO dish announces the **Young Astronaut Program** to the world press. More than 110,000 school-TVRO terminals by 1992; see Coop's Comments.

COOP'S SATELLITE DIGEST



COOP'S SATELLITE DIGEST published monthly by West Indies Video, Ltd., a Turks & Caicos Corporation with corporate offices located at Grace Bay, Providenciales, Turks and Caicos Islands (West Indies). US offices for processing of subscriptions, advertising, and news material maintained at Ft. Lauderdale, Florida. **ALL MAIL,** including advertising queries, subscription requests, news materials and correspondence should be addressed to **CSD, P.O. Box 100858, Ft. Lauderdale, Fl. 33310.** CSD office hours are Monday-Friday 9 AM to 4 PM eastern time; telephone **305/771-0505.** CSD, now entering its sixth year of service to the TVRO industry, is **AIR**mailed worldwide on the 1st of each month; our companion **CSD/2** is issued on the 15th of each month, AIRmail, worldwide for a total of 24 issues per year. Subscription rates are **$75** per year in US, **$85** per year (US funds) in Canada and Mexico and **$100** per year (US funds) elsewhere. West Indies Video, Ltd. is a **'Pioneer/Dealer Class Member'** of SPACE, the international trade association for the TVRO industry.



A "6" AND "8" JOIN WINEGARD'S

NEW! WINEGARD RECEIVER W/INFRARED REMOTE AND BUILT-IN ANTENNA POSITIONER!

Unlike most other units on the market, the Winegard receiver has a built-in power supply for the antenna positioner, eliminating an extra unsightly box on your customer's TV set. With our wireless, hand-held infrared remote, your customers can select channels up and down and control the antenna positioner from the comfort of their armchairs. Many other features, too, including automatic switching between satellite and regular TV signals through a built-in bypass switch. Check it out.

Choose from Winegard's new trio of perforated deep dishes

You have one customer who demands studio-quality pictures on all 100-plus satellite TV channels, and another customer who might be satisfied with fewer channels but wants his dish on the roof. How do you satisfy both with one size dish? You can't!

That's where Winegard's full line of "see-thru" aluminum antennas comes into your profit picture. Instead of trying to suit everyone with one dish, Winegard is offering three DIFFERENT sizes to give your customers a custom fit.

FANTASTIC "10"

Joining Winegard's popular 10-foot dish are two new sizes - our 6- and 8-foot models. All three deliver exceptional pictures for their respective sizes - at an affordable price. Unlike solid metal or fiberglass dishes our perforated aluminum antennas are lightweight and easy to handle. The 10-foot weighs 92 pounds, the 8-foot weighs 48 pounds, and the 6-foot weighs just 17 pounds. The exclusive Winegard construction provides for simple installation. They go together quicker than any other dishes in the industry! And, our 6-foot roof mount allows you to install the 6-foot dish on just about any roof - easy as installing a conventional outdoor TV antenna.

With Winegard's line of quality satellite TV antennas you can offer your customers features like:

- Smoked chrome protective finish
- 125 mph wind survival rate
- Deep-dish design with F/D ratio 0.283 on all three dishes
- Patent Pending construction

As Advertised in PLAYBOY, SPORTS ILLUSTRATED, and PEOPLE.

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WINEGARD®
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COOP'S SATELLITE COMMENT

- **BIRTHDAY Emotion**
- **ONE For New Dealers**
- **SUPPORTING The Dealer Board**

DISTRIBUTOR Profile

"I think this may be the last year," said the soft-spoken gentleman, "that we can function as telephone order takers. There are so many pressures building on the distributor that 1985 will be a year of considerable change."

Fact. Some of the major brands, those that command dealer respect, are starting to play 'hardball.' It is no longer considered unusual to have a supplier (OEM) tell a distributor "If you want to carry OUR receiver line, you will have to DROP the 'XYZ' line." The much sought after bigger brand names have decided that if a distributor is going to do them 'justice' and actually move a big volume of the OEM's equipment, he should **not be** handling one or two or three essentially **competitive** brands or models. On the surface that means not only more distributors, each carrying fewer brands, but more **'brand loyalty'** ahead.

Fact. Some of the more aggressive distributors have begun to put field sames/engineering people on the road to call on dealers (see Coop's Comment on page **84,** here). The best results are occurring when the salesman type is fluent in TVRO language and technology; when he can make his one hour visit with a (present or potential) dealer client a mini-learning session for the dealer. A dealer who comes to rely upon the traveling sales guy for both equipment and facts soon takes all or the bulk of his 'trade' to that distributor. There is more **'distributor loyalty'** coming.

Fact. There is far too much product in the pipeline; all of those great projections for 500,000 or 600,000 **new** TVRO systems during 1984 were at best overly optimistic. This will be a good year if we somehow get to 350,000 new terminals actually 'in the ground' and 400,000 would be outstanding. The market, late in September, is 'soft' in **some areas** of the country. **It should not be soft anyplace.** With an overabundance of product, much of it from off-shore, the low end of the market is glutted with cheap hardware that will eventually end up being sold by the pound rather than by the piece. This will hurt distributors who sell only on price and who have somehow overlooked the 'quality ingredient.' When the price becomes by-the-pound rather than by-the-piece, they are out of business. **Loyalty to price and only price** is hurting the marketplace and that, too, will pass before 1985 is history.

Fact. An entire new breed of TVRO distributor is entering the marketplace; firms that traditionally have stayed out of TVRO are entering the industry for the first time. They have been in the distribution business in other, often allied, fields for many years handling refrigerators and (RCA et al) television and stereo systems. Their broad based distribution business is important because these people have products which are not nearly as seasonal as TVRO. They'll stock up on TVRO when it is 'TVRO season' and they'll stock up on air conditioners when it is air conditioner season. But they won't go out of business because **it is** air-conditioner and not TVRO season. And they will survive long after the TVRO-**only** distributor has folded up his tent because he couldn't match the latest Korean price in receivers. **Dealers will support this breed of distributor** because they will recognize that this distributor will still be here when the last Korean has left the industry and this will create a new world of **'dealer loyalty'** towards distributors.

The distributor profile shows us a rapidly maturing, rapidly changing businessplace. The glut of equipment now in the pipeline will ultimately spell the demise of many of the price-only-consideration distributors now functioning as telephone order takers. They will be the ones who get hurt the first, and the hardest, when the fall selling 'season' is over and there are thousands of Korean or Taiwanese receivers stacked up in their warehouses. 'Inventory liquidation' will be a new term in TVRO, and we should start hearing it around the 1st of January. In my humble opinion, the best way to liquidate that which needs liquidating will be to send it back to its country of origin; COD for shipping charges!

Fact. Brand names, those like R.L. Drake and Chaparral and Houston Tracker, are in short, **controlled** supply. The catch phrase here, this fall, is 'allocation.' Echosphere gets the Drakes it needs, or ordered, because it agreed early this year to **commit** to a sizeable purchase of Drake product for a year. Echosphere gets Drake while many of their competitors, those that lacked the courage or bucks to commit for a scheduled amount of Drake product way back last spring, have to try to **switch** would-be Drake buying dealers to some substitute product. The products with **brand recognition** are on allocation because intelligent dealers are buying products which they **know** will be backed up by concerned OEMs. Brand recognition comes because the manufacturer has very carefully planned the creation of a brand and product image for his antennas or receivers or LNAs. The fly by night brands, here-today and gone-tomorrow, seldom have the intelligence nor the time to spend six months creating an 'image' for their products. I pity the distributor stuck with products which nobody recognizes by name. **"Have you tried the new Yung-Yuk-Muk receiver?"** asks the distributor of the dealer. The dealer asks him to **repeat** the name. That's the very instant where the distributor should put the dealer on hold and authorize spending $20,000 to create an 'image' for the new product line. If the distributor is speaking with an established dealer and the dealer has never heard of the product brand name, the distributor is in alot of trouble trying to sell that product.

It is this marriage, of brand-recognition by dealers, and distributor skills in backing up dealer needs, which creates the successful TVRO product line. There are a dozen or more cheap receivers now in the marketplace and each has only one thing going for it; its price. None have universal dealer recognition; few have established distributors really pushing the product. I would venture that none have any type of real warranty repair and service program in operation. All of that costs money, and if you are marketing 'cheap' there is no money left over for such 'luxuries.'

So dealers be warned. If you are buying cheap because it is cheap, **you** had better be prepared to do all of **your own** service work on the products. If you are buying from a distributor who is essentially nothing but an order taker, who spends none of his money on providing you with training and backup services, be prepared to find a new distributor; soon. **Cheap is cheap because something is missing.** If all of the parts are still in the receiver, and it still plays, the **missing** ingredient must be 'service'! Every legitimate product in the marketplace is 'costed' from the OEM with unit cost plus service cost plus promotion and distribution cost built in. If you don't budget anything

per unit for service or promotion, you can certainly make the product go to the dealer for fewer dollars. You can also count on having to shift any service costs for that product directly to the dealer. And the dealer can count on having to pick up those costs.

If you never print any data sheets, never do any trade advertising, never provide the dealer with point-of-sale consumer handout sheets, never provide the dealer with any ad-mats, you can reduce the cost of each unit shipped. But if you are the buyer, and you buy only because it is cheap, don't expect any of the services that Drake or others provide.

Everything costs money; there is no such thing as a free lunch. There are always ways to do it cheaper. As the sign on the print shop wall says:

"You want good printing, fast and cheap? Pick **any two** and call me back!".

If you want good radios, cheap, backed up with full warranty, promotion, and service plus training, you'll have to drop cheap. It's just that simple.

TYING It All Together

Television, as a medium, has a fascination for many and I am little different than those others so afflicted. Apparently many of you share the malady or this industry would not be flourishing.

I dabble in television production on a routine basis; down in 'the islands' our national television network has gone through every imaginable embryonic stage from pure 'network repeater' with no local programming to an extensive local program schedule. I even get on camera on occasion myself and one particularly, memorable 'hip-shot' local program was produced with no planning one Christmas eve some years ago when Kevin and I decided around 10 PM to drag out some of our rare and collector-item 'out-takes' and share them with our island viewers. We pre-empted the 11 PM scheduled programming and fired up the studio lights with a pair of cameras set on automatic pilot. Kevin ran the switching and I assumed the role of on-camera personality. The cameras were set up in the videotape editing area of the studio and I 'hosted' an on-the-air search for appropriate out-takes to broadcast. I'd talk about out-takes in general while manipulating the high speed search controls on the console in front of me and finding one that I felt might entertain the viewers, I'd cue it up on the monitor screen and then audio-cue Kevin to 'take' that input on the switcher and we'd roll it to the audience.

Most out-takes are brief; **Peter Jennings** reporting from Egypt, for example, where at the end of the satellite-fed piece the cameraman did a slow pan downward on Peter's standing body, away from his sport coat and tie to his legs; only Jennings was wearing no pants, only boxer shorts(!). After about an hour of this we wished everyone in the islands 'Merry Christmas' and returned the system to the regular satellite feeds. Having your own television studio and a means of transmitting whatever you create in that studio to your 'universe' has its advantages and disadvantages.

The creation of **'TVRO's Fifth Birthday Party'** for television was not quite so 'hip-shot' as Kevin's and my Christmas 'present' to the Turks and Caicos Islands. If you consider that some of the video clips used in the birthday program were recorded in 1977, I guess that you could say it was 7 years in 'the making.' The writing of the TV program began at about the same time as the creation of our October 'Fifth Birthday Issue' of **CSD;** or May. Since I was routinely reviewing the older industry video tapes to research the October issue, it was just as easy to mark-for-use clips for the TV program as well. Ideally, the October 1st issue and the October 18th telecast would compliment one another. If you carefully read the October issue, and then sat down to watch the October 18th telecast, you had to come away with an excellent understanding of how TVRO evolved since the video show served to compliment and re-enforce the October issue.

I had wrestled with how the final production would be put together for some months but even as late as the Nashville industry show, had not made a firm decision on how best to assemble the program. It was during the Nashville show that **Don Hunt** from Nashville took me to meet with some people at a post-production editing house called **'Post-Masters.'** This Nashville firm takes you and your disassembled video footage and creates completed air-able programs. Their facility was brand new this past January and it is equipped with the latest and most versatile video editing gear known to man. Better than their equipment, it is staffed with editing and engineering personnel who are top level pros. I had shopped around in advance and their $575-per-hour rate to allow you to use their equipment and personnel was not out of line in this industry. If $575 an hour to use equipment and people seems like a big chunk to swallow, you have to balance those charges against the $1.2M in equipment they had to acquire to open up the business earlier this year. The bank of $80,000 one-inch tape machines, all of the video special effects, the totally computer-controlled editing system all come together at the editing console where the 'editing producer' and you sit to create the final program.

The process works like this:

1) Your original video, typically on 3/4" tape, is initially 'bumped up' to 1" tape. This bump-up gets the original material to the format which the Post-Masters equipment uses.

I had off-line-edited all of the individual video pieces onto 3/4" "masters" at our WIV-TV facility on Provo. I had several hours of 3/4" material arranged in the same sequence as it would ultimately appear in the final, edited form of the TV show. Some of this material originated at WIV in 1/2" format, some in 3/4 " format. When I arrived in Nashville with 15 separate off-line 3/4 " tapes in my blue over-shoulder bag, it was all arranged as we would ultimately use it.

2) Two identical 1 " tapes are made in bump-up so the editing can proceed, even within a segment, from machine to machine. We would ultimately be using four separate 1 " Sony machines simultaneously switching and dissolving from machine to machine, under computer control, as I directed.

When I arrived in Nashville, the program had been scripted and timed to the nearest frame (1/30th of a second), piece by piece, to the **full** 2 hour length. I probably had 300 hours in the project at that point. The more work you do in front, and the better your 'story board' layout, the shorter time you spend tying up Post-Masters equipment and personnel. We would ultimately be there 11.5 hours creating the two hour finished product, after spending an additional 3 hours 'bumping-up' the 3/4" masters.

3) The skills of the editing-producer are very important since he has to make the equipment function smoothly and translate the client's wishes into a finished video product. You can do some pretty amazing stuff with modern video processing equipment and with split (video from audio) editing, make virtually **any words** you wish come out of **any mouth,** or make it appear that

COOP/ continues on page 74

TVRO/ 5 YEARS AGO*

Readers were urged to watch Coop's **'Satellite Magazine'** TV program in December for a videotape report of the FCC's October 18th decision to deregulate TVROs. Gardiner Communications announced it was buying SCI, a manufacturer of LNAs and TVRO receivers, entering the TVRO antenna business (a 5 meter fiberglass would be first; they were also negotiating a license with Oliver Swan to manufacture his spherical antennas).

Parabolic-antenna-basics explained how a parabola works and the differences between prime focus and Cassegrain feeds. Feeds and flanges were explained and 'Solar Outage' was detailed with photos taken of the effects of the twice-per-year-event. Building a four output video distribution amplifier was featured and a fellow in Alabama had a surplus 7 GHz microwave system he wanted help in modifying to receive TVRO signals!

Western Union was testing a three-for-one digital video system, trying to send 3 video signals through a single transponder. A Dominican Republic TV station, losing its Intelsat delivered feed for the World Series because of hurricanes, 'broke the law' and installed an 11 meter terminal to take the feeds from a US domestic bird. Intelsat threatened to sue . . .

Oliver Swan explained his spherical antenna design, RCA was demonstrating a pair of scrambling systems ('Smarts' and 'Two-For-One') and **CSD** looked at 'cooling' your LNA to lower the noise temperature!

***From the pages of CSD, November 1979**

The BR Futureproof™ Warranty. It Protects Something More Valuable Than Equipment: Your Reputation.

Word of mouth advertising from customers can make you or break you. So make sure you get compliments—not complaints—with BR's exclusive "Futureproof"™ five-year warranty. It's the first opportunity for TVRO customers to buy an extended protection plan for their systems at the time of purchase, just like they buy for their cars.

As a BR Satellite Communication dealer, you can offer "Futureproof"™ coverage for a minimal cost to your customers (and a profit for you).

Backed by one of the world's largest insurance companies, BR Satellite will guarantee all electronic components against any manufacturer defects for a total of five years (Including the first year which we cover automatically). Contact us to discuss all the details —then "Futureproof"™ your reputation.

Immediate Free Replacement Service.

BR Satellite is the only distributor in this industry who will replace any defective TVRO product with a new unit, just by making one toll-free phone call. ***Before*** *you send the defective unit back and at* ***no*** *cost to you.*

The "Futureproof"™ Decal—a Sign of Success.

If you've got it, flaunt it! The "Futureproof" warranty sticker in your store window could be your best salesman. We'll send brochures and in-store displays, too.

Our Standard Warranty—Still the Ultimate, Still Free.

Every piece of equipment we sell is backed by our unconditional replacement policy for a full year.*

It's an irresistible sales tool, and it won't cost you or your customers a cent.

We'll ship a replacement via UPS Blue Label, at our expense, the same day you call us. We ask only that you ship the defective unit, at your expense, within 5 days *after* you receive the replacement.

At BR Satellite, there is no "turnaround" waiting time. And only a bare minimum of your valued customer's down time.

We Distribute More Than Equipment: Free Ads, Brochures and More!

Our total dealer support program can provide you with ad art, ready for you to run and brochures to educate customers.

Famous Names. For Dealers Only.

MTI	Arunta
ECI Antennas	Sat-Tec
NORSAT LNAs	Seavey Engineering
Chaparral	Newton Test Generators
Earth Terminals	Satellite Ground Components
Wilson Microwave Systems	ERI LNA Jumper Cables
USS Maspro	Earth Station Accessories
Dexcel	Coax-Seal

Toll-free ordering. Same Day Shipment.

Every product we distribute is in stock at all times. If you call our toll-free number before 2 PM, we'll ship your order the same day. And unlike some distributors, we're happy to ship C.O.D.

*All products and items discontinued during warranty period not subject to immediate replacement.

"We Distribute Trust." **1-800-421-0148** (NEW YORK ONLY) **1-800-832-6660**

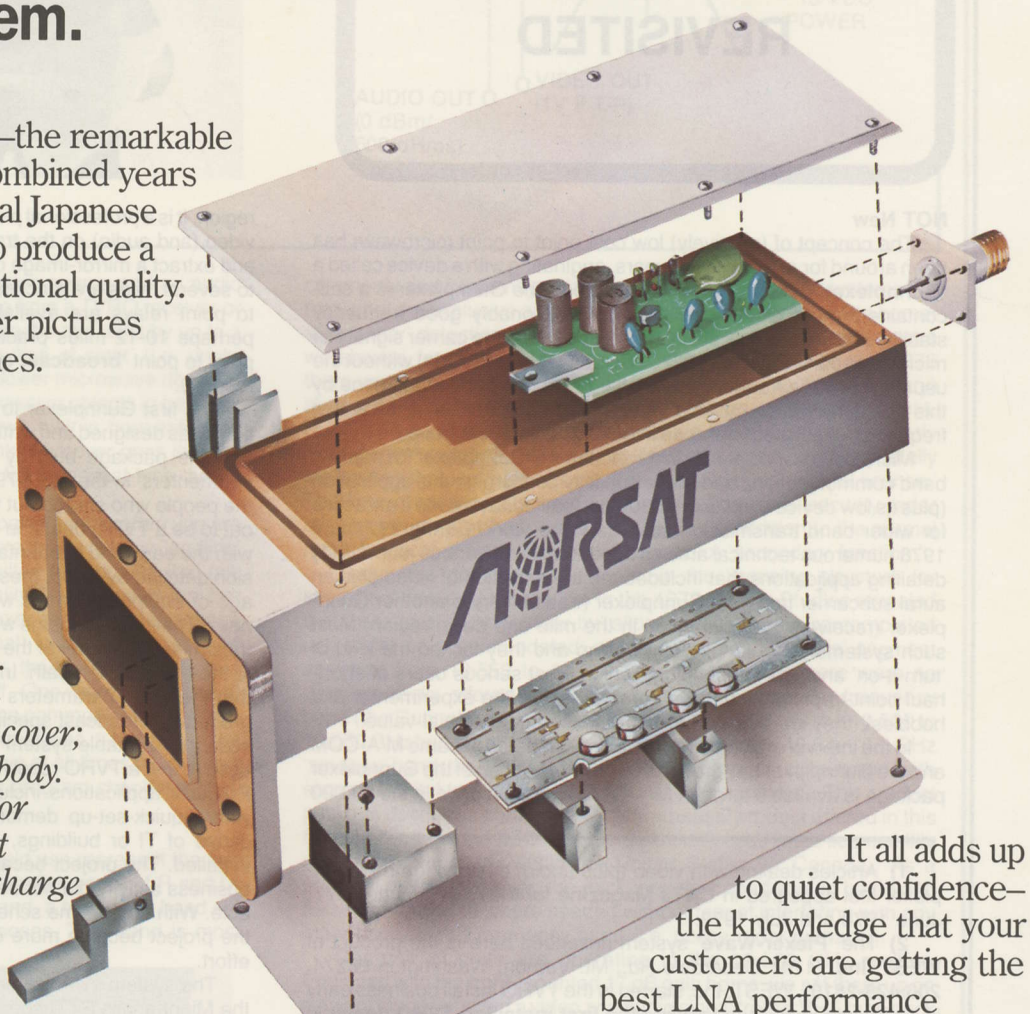
Call Toll Free 9:30-5:30 E.S.T. Mon.-Fri.

BR SATELLITE is the only distributor in this industry who will replace any defective TVRO product with a new unit. We'll ship a replacement via UPS Blue Label, at our expense, the same day you call us.

With Norsat's LNA, Your Customers Will See Less Noise. With Our 1 Year Warranty, You'll Hear No Noise From Them.

Introducing the quiet one–the remarkable Norsat LNA! Norsat has combined years of experience with traditional Japanese manufacturing excellence to produce a low noise amplifier of exceptional quality.

Quiet quality, for better pictures even on today's smaller dishes. Degree for degree, dollar for dollar, the Norsat is simply the quietest, most efficient LNA ever made.



U*nique all GaAsFet four stage design (no bi-polars) with min. 51 db gain.*

T*otal weatherproofing–precision milled recessed top cover; computer-milled aluminum body.*

G*rounded input probe for maximum protection against failures due to lightning discharge or high ambient RF fields.*

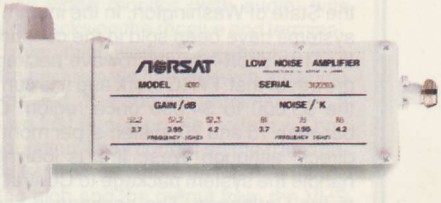
T*riple sealed and ruggedly mounted type "N" output connector.*

L*ow VSWR resonator for transparent impedance match into the first* GaAsFet *stage.*

S*eparate power supply board featuring ultra-stable regulation with built-in protection against polarity reversal, voltage fluctuation, and static discharge.*

A*vailable in 100°, 90°, 85°, 80°, and 75° noise temperatures.*

It all adds up to quiet confidence–the knowledge that your customers are getting the best LNA performance for the price. BR Satellite is proud to be the only distributor in the Eastern United States for Norsat LNAs, and one of only three distributors nationwide.



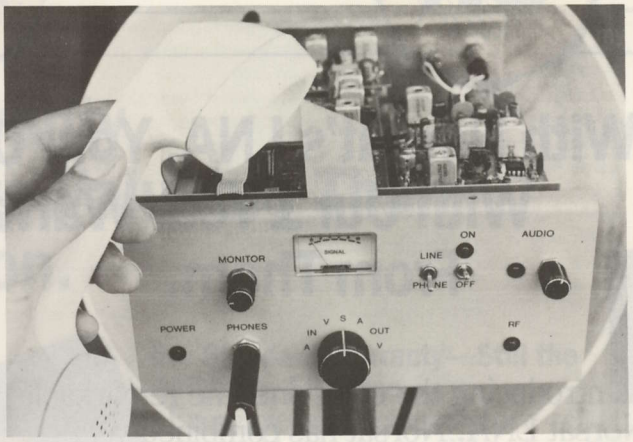
Quantity Prices Available.

"We Distribute Trust."

Dealers Only.

NORSAT

GUNNPLEXER VIDEO MICROWAVE REVISITED



NOT New

The concept of (relatively) low cost point to point microwave has been around for at least seven years, originating with a device called a **'Gunnplexer'** at **Microwave Associates.** The Gunnplexer is a self-contained 'gunn diode' oscillator with reasonably good frequency stability and the unusual ability to **directly generate** carrier signal in a microwave band (such as 10.5 GHz, 12.5 GHz or 21 GHz) without the usual microwave frequency multiplier networks. In decades gone by this would have been called a 'free running oscillator' since the actual frequency generated in the device is not crystal controlled.

Microwave Associates first developed the Gunnplexer for narrow-band communications and some publicity concerning this application (plus its low device cost; under $300 per 'pair' today) made it attractive for wider band transmission such as video work. During 1977 and 1978 numerous technical articles appeared in the various journals **(1)** detailing applications that included the transmission of video plus an aural subcarrier from one Gunnplexer (transmitter) to another Gunnplexer (receiver) over distances in the mile and down region. Most such systems were simplistic in design and they lacked the kind of 'turn-it-on' and use-it technology which most serious users of short-haul point-to-point microwave demanded. For the experimenter and hobbiest, they were great fun but of limited commercial value.

In the intervening years Microwave Associates became M/A-COM and the Gunnplexer has grown up. Today, a version of the Gunnplexer package is available through M/A-COM with a list price in the $6,000 region. It is a professional piece of gear which allows the user to plug in video (and audio) on the transmit end and at the opposite (receive) end extract a mirror-image of the original video and audio. Distances to several miles are practical with portable configurations; fixed point to point relays are available as well with coverage distances to perhaps 10-12 miles practical. This has remained the lowest cost point to point **'broadcast quality'** microwave system available, until recently.

The first Gunnplexer to be utilized for video microwave applications was designed and written by about **CSD** editor Bob Cooper **(1).** A portable package built by Coop was widely copied by other 'experimenters' in the 1977-79 era and as fortune would dictate one of the people who started out with "Coop's Microwave" would later turn out to be a TVRO dealer in the State of Washington **(2).** Not satisfied with the early and elementary approach to video and audio transmission detailed by Coop, these experimenters set out to create a package of equipment which would augment their growing TVRO business. Their first concerns were that the video and audio applied to the transmitter come out of the (distant) receiver as 'opaque' as possible to the transmission path. In other words, no degradation. This meant that the video parameters and the audio parameters had to be upgraded to 'broadcast specifications' since they imagined a fully suitcase transportable system which could be set up within minutes and used to link a TVRO receive antenna with a remote viewing location. Practical applications included the use of such a system in areas where quick-set-up demonstrations were required but where, because of TI or buildings, a portable TVRO antenna could not be installed. The project became a labor of love since their day to day business activity did not depend upon having such a package available. With no set time schedule and no fixed developmental budget, the project became more of a 'passion' than an all out commercial effort.

The system evolved through a number of proto-types and during the Minneapolis STTI show in June of 1983 it was carried in its own 'suitcase' to be shown to Coop. Several suggestions were offered to the creators concerning the packaging and the best method of bringing the product to market. Slightly more than one year later it again traveled to a TVRO show (Nashville in September) where it was again shown in what was now a completed form. That package of equipment is now in the Turks and Caicos Islands where it is undergoing extensive testing and real-world use as a part of the WIV-TV transmission system.

WHAT It Does

Imagine having a suitcase with a total weight of around 20 pounds. Inside the suitcase are two primary pieces of electronics which comprise a totally transportable point to point microwave system, capable of sending a full television program (with audio) **and** a companion two-way (duplex) audio communications channel over distances of 1 mile or more (considerably more with larger antennas; a point to be discussed).

To operate the system you pull the twin (but not quite identical) 'boxes' from the suitcase and mount each on a standard medium-duty

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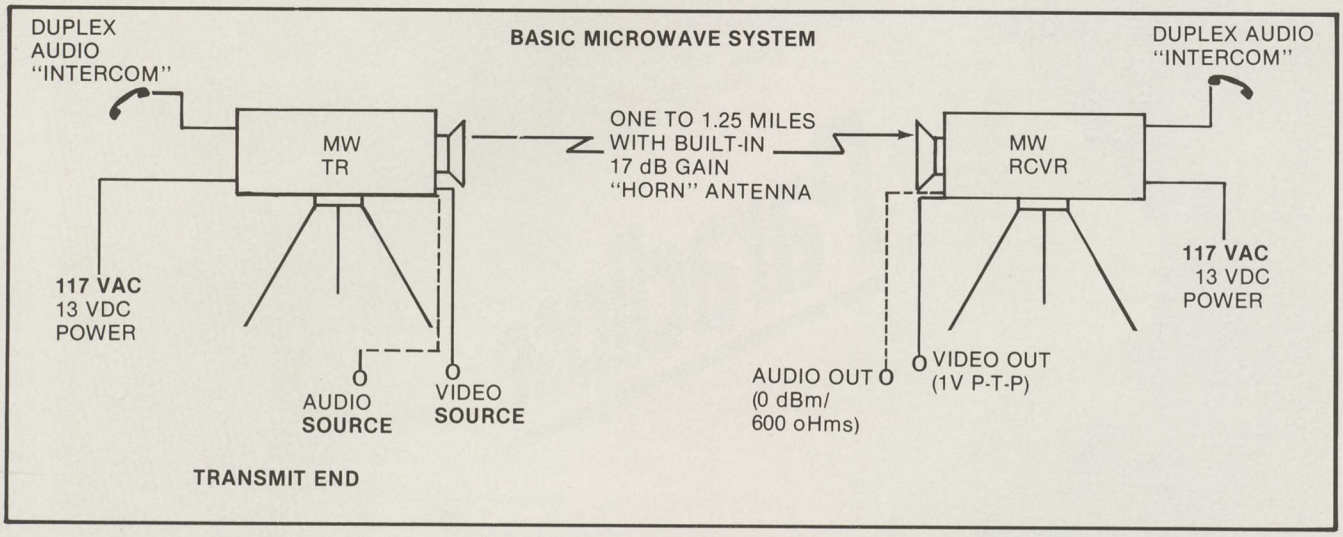
1) Articles dealing with video (plus audio) designs for the Gunnplexer first appeared in **CATJ Magazine** for May 1977, June 1977, June 1978 and July 1978.

2) The **'Plexer-Wave'** system described here is the product of **WEST, Inc.** (1741 Cedardale Rd., Mt. Vernon, Washington 98274; **206/428-2810**). WEST, Inc. started in the TVRO install business early in 1979, and lays claim to being **the first installing TVRO dealer** in the State of Washington. In the interim years, more than 1,200 TVRO systems have been sold in the consumer field and installed by West, Inc. The short-haul microwave package described here was an outgrowth of that TVRO work and it is currently avalable on the market in the $3,000 to $4,000 price region. Current production capacity is between 15 and 20 'systems' per month. All equipment is sold 'factory direct,' although West, Inc. is looking for a qualified distributor to handle the system package to Central, and South America, as well as to the Caribbean. The package is compatible with both NTSC **and** PAL format video (plus audio) signals.

3) The standard parameters are **(a)** operating frequency/10.525 GHz, **(b)** capacity is 525/625 video with duplex audio channel**s** (2), **(c)** modulation is FM with a deviation of ±5 MHz, **(d)** video signal to noise at threshold is 40 dB or better, **(e)** video bandwidth is 4.5 MHz, **(f)** audio subcarrier bandwidth is 12 kHz, **(g)** built-in horn antenna gain (removed when feeding a dish) is 17 dB nominal, **(h)** powering is from either 117 VAC **or** 13.6 VDC (switchable) with a pair of separate power cords, **(i)** audio output is approximately 1 volt maximum to 10K ohms unbalanced while **(j)** the video output is 1 volt peak to peak.



camera tripod. At one end you plug in a video source and an audio source, such as the video and audio coming from a TVRO receiver or a TV camera and microphone. You separate the two units by up to a mile (or more) and insure that there is a 'line of sight' (i.e. unobstructed) path between the two units (low power microwave does not bend over buildings nor penetrate wet or massive objects in between the two units). Turn on both units, point the two 'built-in' horn antennas at one another and you have an instant link; whatever goes into the transmitter comes out of the receiver. With full broadcast-type quality and specs.

The package does one more thing; recognizing that often you are using such a system in a situation where there is no available 'landline' communications, there is an (optional) built-in fully duplex (i.e. talk both-ways simultaneously) telephone-quality link between the two units. This is possible because the Gunnplexer portion of the package (that which generates the microwave signal) is utilized for both the transmit and receive modes. The receiver, therefore has the same miniature transmitter as the transmitter itself. One way to make use of this 'return signal' is to modulate it with voice communications. Since the two units operate at slightly different frequencies, a function of the IF chosen, you have fulltime audio both-ways at all times **in addition to** the one-way transmission of video plus program channel audio.

HOW Well It Works

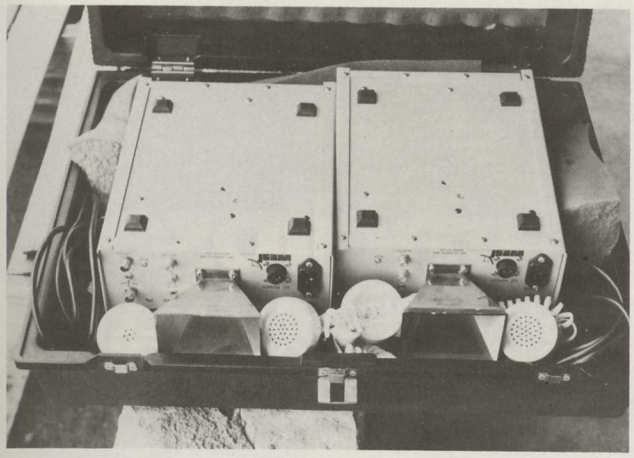
The units brought to WIV for test and field use represent the first production run of the system, after the nearly five years of R and D. The system operates in the 10.525 GHz band, a frequency band set aside for 'radar' and 'developmental' purposes. This band is most commonly and frequently utlized by police K band radar systems but that is not the exclusive application. Another common user is a home-style 'radar' detection system; with such a system you can protect a warehouse, for example, from unauthorized entry. Way back in 1978 there was one company which figured out a way to 'license' (very) short range **video relay** for purposes such as we are describing here. FCC 'type accepted' personal security (in-room radar) was clearly legal in this frequency band; TV, or video plus audio, was only totally legal when the user of the equipment had a 'developmental license.' The firm in question obtained type certification for a 'security radar system' **which just happened to include** (in addition to the normal radar function) a way one video (plus audio) 'secondary function.'

There was considerable interest in the licensing structure for short-haul, low-cost microwave in the 1977-79 era. Studies revealed that there was another 'near-by' allocation where the contemplated use might be accommodated; a 'mobile communications' segment assigned from 10.550 to 10.680 GHz. In the end, there were no products really offered in this use area in this particular frequency band (the Gunnplexer units were originally designed for the 10.500 to 10.550 GHz band; a subsequent version covered the 10.0 to 10.5 GHz 'amateur' band; the 10.500 to 10.55 GHz versions could be tuned [with some difficulty] to the 10.550-10.680 GHz assignment). The product package described here is the first commercial product offered in this frequency range and **CSD** makes no statements as to the licensability of the equipment **(3)** within the United States (or Canada). As a practical matter, however, the packages described should be able to be set-up and used where needed without fear of interfering with any other users in this frequency band (i.e. police radar primarily).

Our pair of units are operating in the 10.550 GHz **region.** Equipped with the front-mounted 17 dB gain horns, we set them up on a pair of tripods and fed a video and audio signal from a VHS tape deck into the transmit end. A common video monitor (with audio) was connected to the appropriate output jacks on the receive end terminal. The units came on instantly, and everything worked as it should over a 100 foot test range. The only learning curve we had was with the audio modulation control on the transmit end. The audio is transmitted on a subcarrier (4.5 MHz) and when we first turned on the system we had no audio. There is an audio 'modulation' level control on the transmitter, as well as a video modulation level control; both on the rear panel. We had the audio cranked up too high and the output from the VHS ENG deck was so hot that we were driving the input audio stage into 'limiting'; i.e. it was 'shutting down' because it had too much audio drive. Reducing the audio modulation control took care of that.

The transmitter and the receiver have multi-function metering:

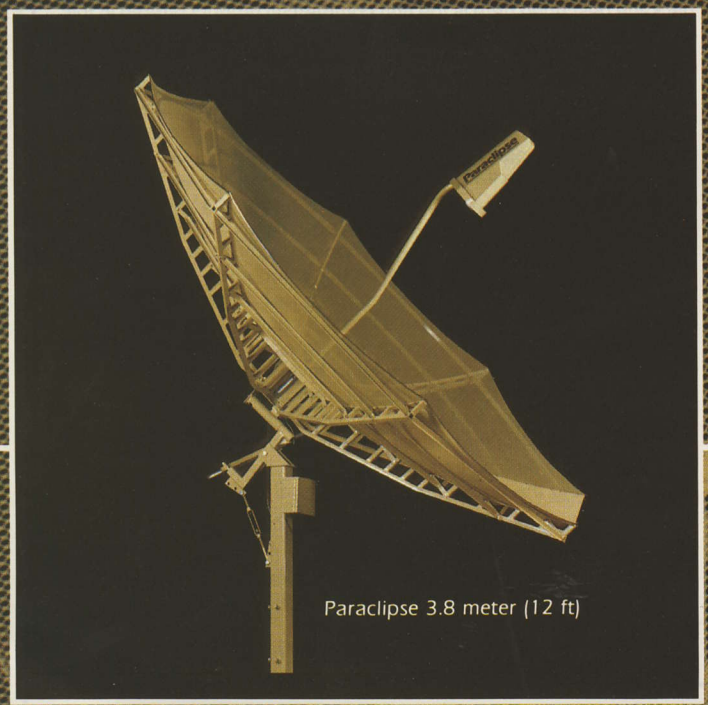
1) You can monitor the signal level from the companion unit (an 'S' meter that we found handy for peaking the antennas as the paths got longer);



SUITCASE transportation; about 20 pounds in weight.

GUNNPLEXER/ continues on page 12

Not Just Another Pretty Face



Paraclipse 3.8 meter (12 ft)

Mark Fator photographer

Paraclipse™

HIGH PERFORMANCE
SATELLITE TELEVISION SYSTEM

Paraclipse Inc. 3711 Meadowview Drive
Redding, California 96002 (916) 365-9131 244-9300

PIONEER MEMBER OF
PRISPACE

The term 'tuned feed' is a familiar, and frequently misused phrase in the satellite antenna industry. The theories behind the tuned feed concept are well tested and are proven to be sound. Its meaning is rather broadly interpreted and the appropriateness of its use is not always apparent. The question as to whether you actually get a tuned feed with a particular antenna is debatable.

We hope you will spend a few minutes reading this ad. Perhaps it will clear up some of the mystery about tuned feeds and allow you to draw your own conclusions.

A Measure of Performance

An antenna's performance is determined by how cleanly it can amplify the microwave signal (expressed as gain), without amplifying unwanted signal contamination (expressed as noise). Since noise is always present to some degree, it must be considered as part of the performance equation.

Greater gain, lower noise, means better performance. This equation of signal gain over noise temperature: G/T, is an antenna's measure of performance.

Feedhorns in General

Each feedhorn configuration is engineered to have an ideal focal length over antenna diameter ratio (F/D), where its optimum performance is achieved. Operation under any conditions other than these 'ideals' will result in a loss of performance.

Antenna manufacturers, with varying degrees of success, design their equipment to conform to these constants. Each antenna manufacturer must base his choice of feedhorn on how closely its specs match the requirements of his antenna.

The result is that todays' market offers literally hundreds of antenna designs that differ in shape, size, surface, parabolic symmetry and focal length over diameter ratios, while there are only a few different feed configurations available to choose between. This inequity creates a situation where some compromise in performance is impossible to avoid unless you have a true tuned feed.

Illumination, Over, Under and Perfect

If the antenna F/D ratio is flatter than the feedhorns optimum focal length over diameter ratio, or the feedhorn is positioned beyond the perfect focal length, over-illumination occurs. The result is a poor picture due to the excessive noise picked up from the perimeter of the reflector.

If the antenna F/D ratio is deeper than what the feedhorn is designed to accommodate, or the feedhorn is positioned short of its ideal focal length, under-illumination occurs. The result is wasted signal, a weak picture and poor performance from too little gain.

For the feed system to properly illuminate the parabolic reflector, it must be positioned at the exact focal point where the microwave signals reconvene. For maximum efficiency, the feedhorn F/D ratio must be tuned to match the antenna F/D ratio exactly.

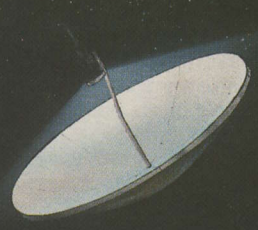
In the recent past, all you needed was a pretty good antenna and enough savvy to choose the right feedhorn. If you could demonstrate a picture, you sold equipment. If you sold equipment, you were in business.

At Paraclipse we think higher performance is everything, and we build our antennas accordingly. We've incorporated some subtle but important changes in the specifications of our feedhorns and have realized a significant reduction in antenna noise temperature.

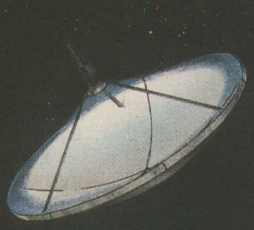
After extensive research and development, range tests prove a 33% reduction in antenna noise temperature for the 2.8 meter Paraclipse and a 32% reduction for the 3.8 meter Paraclipse with the new tuned feed systems. Our focal length/diameter ratios are mathematically perfect and each feedhorn is truly tuned to properly illuminate the antenna reflector it comes with.

The new optimized feed system derives maximum signal strength with a minimum of noise. The result is a stronger, cleaner picture from even the weakest transponder, with greater gain and less noise. The only thing that has stayed the same is the price.

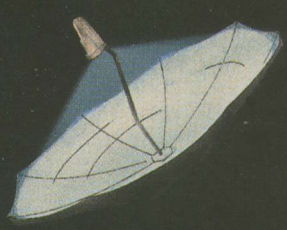
And to top it all off, we have a handsome new weather shroud that is molded in special Paraclipse colors. The new hood is made of tough, ultraviolet stabilized ABS plastic. It will protect the sensitive electronics from the long term effects of sun and weather, and it will identify your equipment as genuine Paraclipse.



Over-Illumination: Excessive noise enters the feed system from the perimeter of the antenna and shows up as sparklies.



Under-Illumination: A poor picture and an inability to monitor a weak transponder. The signal is attenuated and there is too little gain for good performance.



Perfect Illumination: The feedhorn F/D is tuned to exactly match the F/D ratio of the antenna. Full and clean illumination of the entire reflector. A strong, bright picture.

GUNNPLEXER/ continued from page 9

2) You can monitor the video input level and the audio input level on the transmitter end (handy for insuring that you do, indeed, have video and audio driving the transmitter and it eliminates need for a separate monitor);
3) You can monitor the level of the received **video** at the receive end, plus you can also monitor the level of the received audio at **both** ends.

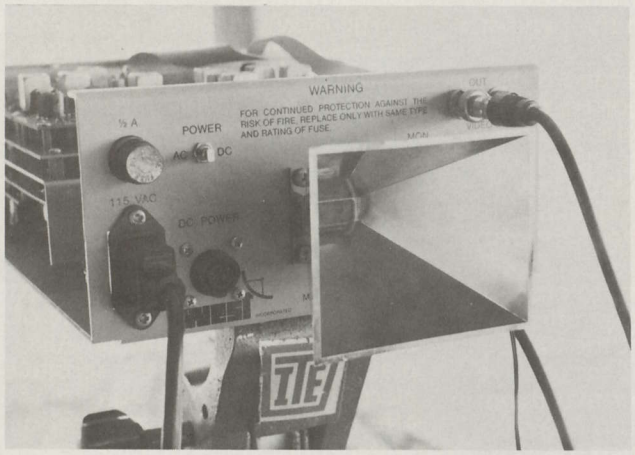
The duplex telephone. At first that seemed like an unnecessary 'option' (it does cost extra) but we quickly found how important it can be to have instant, real time communication between the transmit and receive ends of the circuit. This adds around $750 to the system package cost, and you can rationalize that a pair of quality hand-held transceivers can be purchased for about the same money. Transceivers are simplex (one way at a time) however and if the other guy is talking and you have an important something to say, you have to simply wait until he is finished. With the duplex system, you can tell him anything — anytime, and by being in the same 10.55 GHz region, the circuit is certainly totally private. We recommend potential users consider this valuable option.

After a short haul test we decided to go for broke and immediately packed up the gear and headed with the transmitter portion to a line-of-sight location 2.5 miles distant. We found signals, and we found the 17 dB gain horn antennas fairly easy (as in relatively broad) to align. But we were not in the video relay business **yet.**

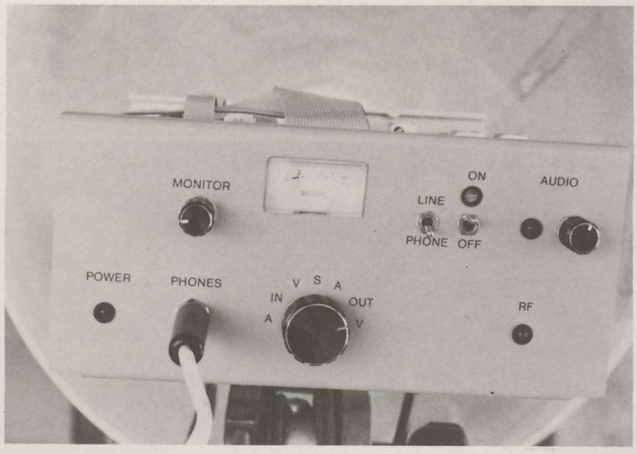
When the system is operating 'below threshold,' the receiver's AFC (automatic frequency control) circuit cannot latch onto the incoming signal. AFC is mandatory since the receiver has to first locate and then lock-to the incoming signal from the transmitter. A weak signal is capable of being 'seen' but not 'locked.' It has the effect of a TVRO receiver on 'scan-tune'; the signal flips in and out at a cyclic rate. Your job is to peak the antennas on both ends (remember that the **transmit antenna** needs to be boresighted **on** the receive location, as well as the opposite end alignment). We found that even when peaked we were not making the 2.5 mile path; **we were below threshold.**

Then the transmitter was moved to a new location 0.5 miles away and we quickly found signals with no difficulty. Having established this was possible, we thought about the problem and decided to re-peak the receiver's IF board tuning (a capacitor that sits 'openly' where tinkers can tweek). We found only a marginal improvement in that exercise, and were satisfied that our 'range limitation' was a function of **system-gain** rather than equipment performance.

Tests conducted with Microwave Associates and other experimental equipment in the late 1970's told us that we should not expect significantly more than one mile range with this type of system when the antennas were simply the built-in horn arrays. However, like all radio (and television) transmission systems, the first mile is 'the killer' and if you could make the system play at 'one mile,' chances are you could extend the range substantially from that point with some additional antenna 'gain.' **We chart that for you here.**



FRONT of 'Plexer-Wave' . . .



AND rear of unit. Full metering of all important functions. Simplistic operation.

HOW FAR CAN IT GO?

TR ← 1 MILE = 'S 117 dB PATH LOSS → RCVR

← 2 MILES = 'S 123 dB PATH LOSS →

← 3 MILES = 'S 126 dB PATH LOSS →

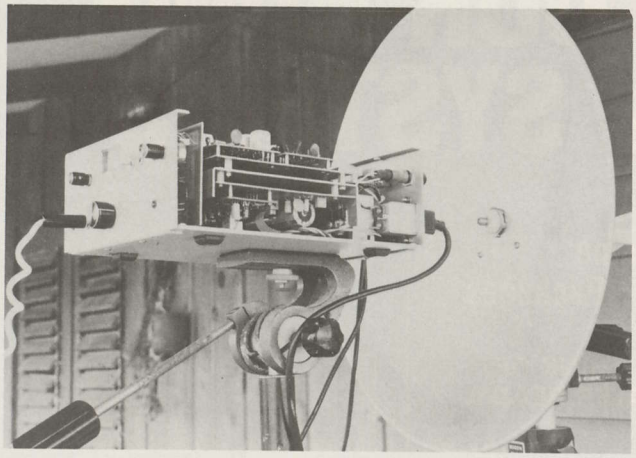
← 4 MILES = 'S 129 dB PATH LOSS →

IF 1 MILE IS "SOLID" **WITH HORN ANTENNAS** (34 dB CIRCUIT GAIN **TOTAL;** 17 + 17). **ADDING TWO FOOT REFLECTOR AT** RECEIVE END **WITH 32 dB GAIN RAISES CIRCUIT ANTENNA GAIN TO 17** (TRANSMIT END) **+ 32** (RECEIVE END) **OR 49 dB. NOW A FOUR MILE PATH IS PRACTICAL** (12 dB MORE LOSS THAN A 1 MILE PATH).

The path **loss,** at 10.5 GHz, in the **first mile** is approximately **117 dB.** This might be a good point to note the transmitter power here is 10 milliwatts; that's 1/10th the power allowed with unlicensed CB range walkie-talkie radios and it is 1/100th of a full watt. Not much. But then we already know that microwaves are pretty amazing stuff.

If you have full FM quieting at 1 mile, you can then make the valid engineering assumption that if you are able to maintain 'line of sight,' you can have the same level of signal at 2 miles (as at one) if you make-up for the additional path loss incurred in between miles 1 and 2. That is **6 dB of additional path loss** (you may recall from past **CSD** features that you **lose 6 dB** of available signal **each time** you **double** the total length of the path). That told us we had to find a way to squeeze 6 dB more out of our antenna system.

Larger horns were one possibility. But we had something handy that was better; a suitable 'junk pile' of small reflector surfaces; miniature dish antennas! A 20 incher was pressed into service in a not very professional fashion (the receiver unit was turned around to face the surface of the parabolic reflector while the parabolic reflector was boresighted on the 2.5 mile distant transmitter signal source). We mounted the 20 inch reflector on its own camera tripod and then went through the steps of boresighting it (visually) and then positioning the



TO EXTEND the basic 'horn to horn' **range of one-mile-plus, we adapted an MDS reflector** (20 inches) **of questionable quality on a second tripod to get us perhaps about 10-12 dB of system gain. It made our 2.5 mile path rock solid.**

It worked, but is not recommended unless you are desperate. Having to adjust the reflector **and** the feed, **independently,** in **all planes,** is a pretty tricky thing in a world where 1/32" differences mean signal (full quieting) and no signal!

The long term solution would be to build a suitable framework into which the 'Plexer Unit' could be nestled firmly; then the reflector would boresight (along with the 'Plexer' feed) like any other **one-piece,** integrated unit (TVRO) parabolic antenna. Too late for publication, we completed a 2 foot version of this and found the system very usable to 4 miles. That's with the basic 17 dB gain horn on the transmit end, and a 32 dB gain two-foot reflector antenna on the opposite (receive) end of the circuit.

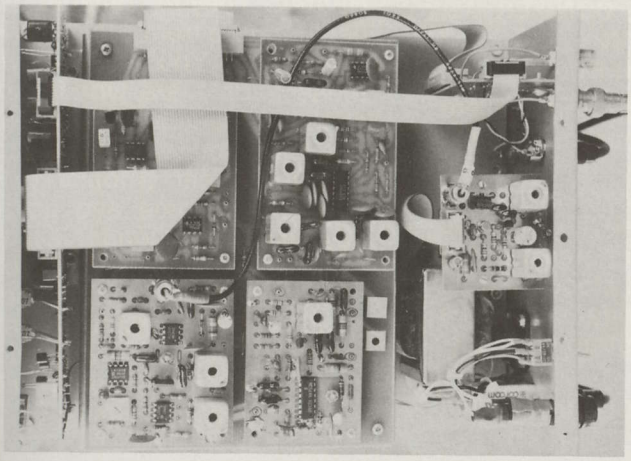
The difference in 'gain' between the horn, and, the reflector + horn is 15 dB (17 versus 32). That means you can do just as well at a distance of 6 miles with the horn/2 foot reflector 'system package' as you can do at 1 mile with the horn/horn system package. Can you do better than that?

Of course. Adding a second two foot dish to the **transmitter end** would increase the system by yet another 15 dB and that would allow you to experience the same results at 32 miles as you get at 1 mile with the horn and horn combo. There are practical limits, of course. They may turn out to be as much mechanical as electrical:

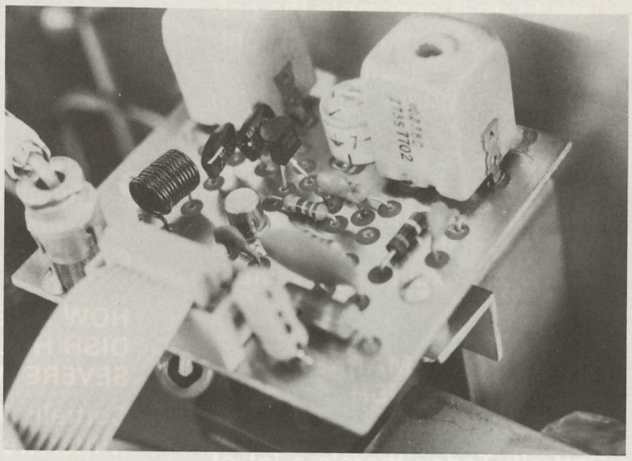
1) We opted to leave the transmit end as a horn because we felt that 6 miles was about as far as we could achieve reliable line of sight for **our** normal operations. Remember, on a flat earth you can see around 5 miles from a height ten feet above ground. With both ends 5 feet above ground, on tripods, the result is about the same. We also knew that it would be far easier to 'find' the transmit end with the relatively sharp beamwidth of the 2 foot dish than it would be to reverse the role and try to find the receiver with the sharp beamwidth on the transmitter end.

2) Small changes in antenna pointing (i.e. error) even with 2 foot dishes are a disaster. If you have to keep the antenna 'rock solid' to between 1/16th and 1/32nd of an inch in all planes, having that 'problem' on **both ends** of the circuit (i.e. **a dish** on **both ends**) seemed like it might be a personnel problem. We wanted quick set up and operation and liked the idea of being able to 'roll' to a news scene and be on the air 'back to the studio' within minutes rather than hours. Too-sharp antenna beamwidths could prove to be a frustration while the two units 'look' for one another moving first one antenna and then the other (never move them **both** at the same time!).

3) Then there is the path anamoly condition. Longer paths, even 16 miles, are going to have occasional outages caused by heavy rain along the path. You need to be mindful of this situation when you are trying to 'stretch' paths. Commercial microwave point to point microwave paths in this frequency range plan for such periodic (weather related) temporary path attenuation by building in a 'margin factor.' At 10 GHz, decades of tests reveal that you need about a 30 dB 'margin' to keep the path useful in even heavy rain. **That 30 dB has to come from someplace;** it usually comes by making the antennas **far bigger than nominally required** to insure that there is 'extra path gain' present when the weather turns foul and the signal levels drop. It is unlikely that **this type** of equipment would be considered for a lengthy path (say over 8 miles) for a **permanent installation** but in case you have such aspirations you should be aware of the problems.



BOARD layering in the professional quality 'Plexer-Wave' **system. The fellows behind this have done their homework and after five years of R and D, they have a reliable package that can be hauled with you.**



WRAP Up

Television signals cannot always be received, from satellite, in the exact location where they are needed. That creates a technical 'loop' or 'link' problem in interconnecting the antenna/receiver electronics site to the desired 'display' location. In those situations where it is not possible or practical to lay out the necessary cable to inter-connect the two points, low cost **'Plexer-Wave'** systems such as that described here could well make the difference between installing a system and not installing a system. The basic package price, without the duplex telephone link, is in the $3,000 region. At that, it is cost-effective in comparison with laying out a bare-bones cable system (coaxial cable) interconnect between two points. For those situations where rapid set up and knock down of a video (plus audio) link is required, there is no substitute for the flexibility and ease of operation of a system such as this. And because it is capable of being set up in just minutes, and will operate from AC or DC powering sources, it is about as flexible as a system installer or low-power televisor could ask for.

"CONIFER IS THE TOP OF THE LINE OF OUR HOME SATELLITE TV SYSTEMS"

During the Past Year 85% of Wes Hunter's Home Satellite TV Systems Sales Have Been Conifer Packages

Wes Hunter, owner of Hunter's TV and Satellite, Inc., Muscatine, Iowa, and Dave Cottrell, general manager, selected the Conifer Home Satellite TV System to replace the existing equipment they had been selling. Today, Conifer's DE-2001 System is their top-selling home satellite TV system.

WHAT DO YOU LIKE ABOUT CONIFER'S DISH?

Cottrell: I liked the Conifer mesh antenna when I first saw it. I like the way the screen is attached to the petals...all you have to do is assemble the petals to each other. It's lightweight and aesthetically, it looks very good. It comes in several colors so you can blend the dish into any surrounding, plus, it has a low wind factor. The average installation of the antenna for two of our men is two hours, excluding concrete work.

HOW DO YOU MARKET THE CONIFER DISH IN YOUR AREA?

Cottrell: Today there's a lot of confusion in the marketplace. Some people are selling low priced satellite systems with claims of crystal clear reception. The average consumer doesn't know what he's buying. We have a lower priced system on display and we show the consumer the quality of the pictures of that system compared to Conifer. Conifer shows the best picture. 85% of our customers buy the Conifer system!

WHAT DO YOU THINK OF CONIFER'S DEALER READY CONCEPT?

Cottrell: It's unique. Everything comes to us in one package... the dish, feedhorn, 100k LNA cables, motor drive, receiver, it's all right there. The receiver incorporates the motor drive control and power supply. And, with the one piece cable, everything plugs together, you don't have to worry about connecting separate wires.

WHAT DO YOU THINK OF CONIFER'S RC-2001 RECEIVER?

Cottrell: The most popular receiver feature is the satellite A or B switch which allows the consumer to push either button and select his favorite satellite. It's very popular among the buyers. The receiver is a good looking piece with everything built right in.

HOW DOES THE CONIFER DISH HOLD UP IN SEVERE WEATHER?

Cottrell: Through this severe winter we had no breakdowns due to construction or workmanship of the system. We recently had some high winds come through our area and our Conifer systems stood up well. I really feel Conifer's antenna is a quality constructed piece.

WHAT ABOUT CONIFER'S SERVICE?

Hunter: We really can't say enough about how well the people at Conifer treat us. They're a service oriented company. They give us a two to five day turnaround in repair service. I've never dealt with a company that has given us such consideration. Their one year warranty policy is top notch.

WES HUNTER DAVE COTTRELL

WHY DO YOU RECOMMEND CONIFER?

Hunter: They're reliable. We get literature from a lot of TVRO companies. You don't know if these people are working out of their garage or if they really are a legitimate TVRO company. We've seen a lot of TVRO companies come and go the past five years. Conifer is in the business for the long run. We've seen their facility. We've seen their antenna manufacturing operation. As far as we're concerned Conifer is going to be around for a long time.

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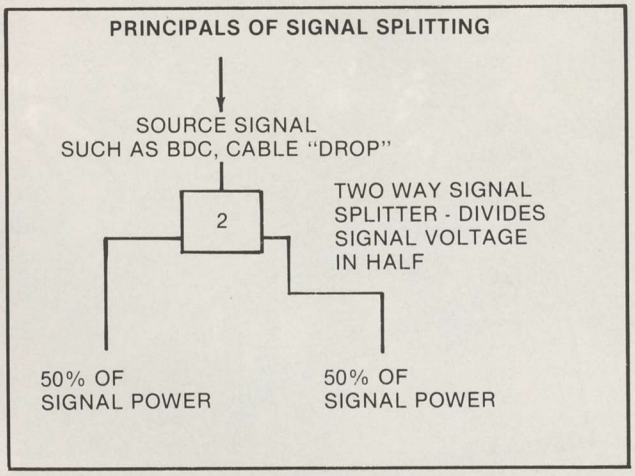
SMATV PLANTS/ INSIDE WIRING —Part 8—



SHARE It

In our continuing series on Satellite Master Antenna Television, we find ourselves at a crossroads in system design and performance. The basic SMATV concept differs little from CATV (cable television), with the primary difference being the 'scaled down' approach to SMATV system design. There is, however, another aspect of 'shared systems' which has taken on additional importance during the past twelve months. It is neither SMATV nor CATV: **some** are calling it **'MicroCable'** for lack of a more explicit name.

This revolution within a revolution began in the spring of 1981 when an engineer in South Dakota named **Keith Anderson** demonstrated a new approach to low-cost receiver design. Anderson had observed that many of the more expensive receivers then being developed used something called 'block downconversion'; a technique which downconverts or shifts the incoming microwave frequency band (3,700 to 4,200 MHz) to a new frequency band in the VHF or UHF region. Anderson did not pioneer that concept (that was done by one Steve Richey in 1978); he did pioneer the **low cost** approach to block downconversion.

The basis for the BDC low cost approach has been **'shared-terminal-use.'** That is, two or more receivers, connected to the same TVRO antenna (and LNA) producing independent transponder/channel selection at each receiver location. The multi-receivers might be located in a single home, or they could be located in multiple-residences. That is a 'legal' question, not an engineering problem.

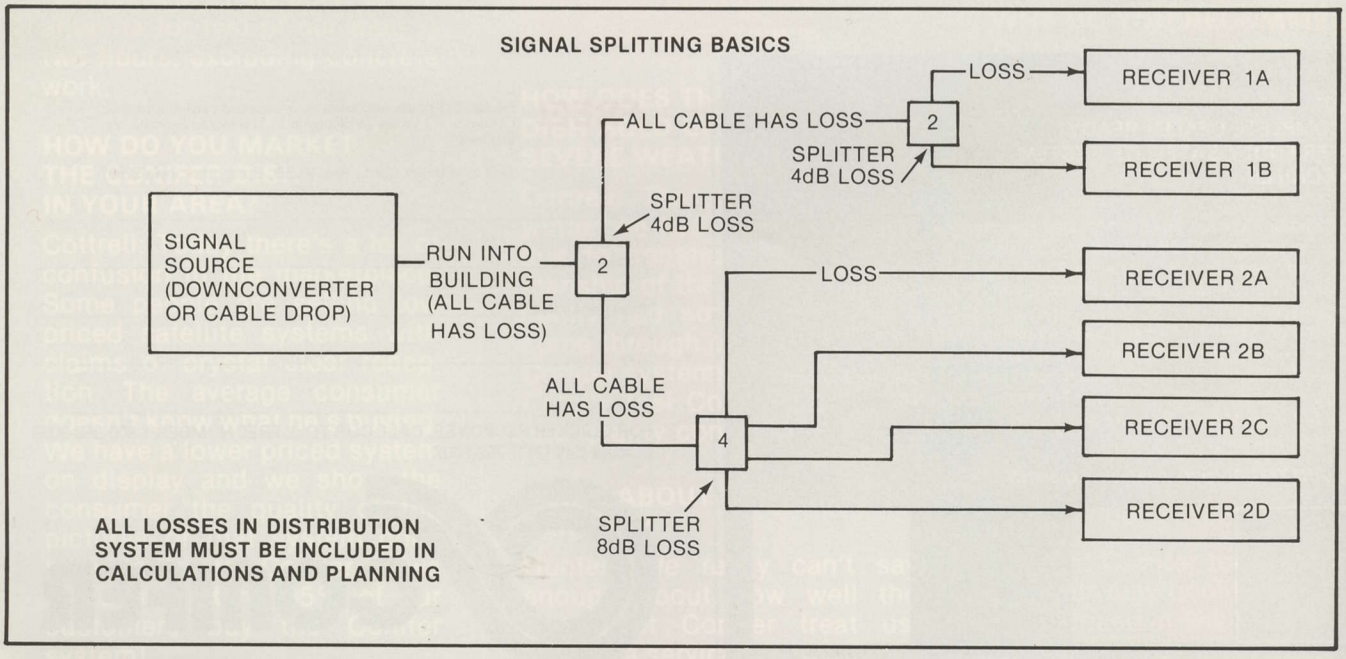
The method and practice required to make such an installation properly perform with antenna and LNA choice will be left for another time; our focus here is on the distribution portion of the system to point out what the installer must be conscious of, and how he grapples with the 'distribution of RF energy' design **limitations** in such a system.

BASIS

Any RF (radio frequency and that includes 'television frequency') can be 'split'; or, divided into parts. The principle is precisely the same as dividing a 'visible' commodity such as a quart of milk. One quart can be divided equally into two pints, four cups, and so on. The total **sum** of signal 'voltage' present before the 'split' is found once again (minus minor split 'losses') after the split, **only in two or more separate** 'containers.'

The most basic 'split' is simply a 'divide by two'; the signal is electrically split into two equal parts. If you remember your electronic theory, each time you **double** your signal voltage, you have **increased** the signal 'level' by something called 3 dB. Conversely, each time you **divide** the signal voltage, you have **'lost'** 3 dB; or more appropriately, you have created two, new, equal signal voltages **each of which** is 3 dB lower in level than the signal voltage you began with.

That suggests that a two-way splitter will produce two signal voltages that are 3 dB weaker at each 'output port' than the incoming, original, unsplit signal. This is not quite so perfect a world and **there**



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are small signal losses attached to the splitting process. No splitter ever built produces two signals that are precisely 3 dB lower in level than the original signal because of those losses. The real world number is more like 3.5 to 4.0 dB 'weaker,' per output port, so when we are planning such a system, we take the 'safe route' and call it a 4 dB 'loss' on the output side of the (two-way) splitter.

A two-way splitter, such as this, is one of the primary in-home wiring components for a CATV or SMATV system. A TVRO BDC system, however, has at least one special consideration which CATV or SMATV does not have; the individual receivers must be kept 'isolated' from one another. How's that?

When we hear the term 'isolation' in TVRO, we normally think of another breed of receivers; **single conversion.** Single conversion receivers have special problems relating to their capability of interfering directly with one another when connected to a common antenna (or when operated with separate antennas in close proximity). Isolation, as it relates to BDC receivers, is another type of 'problem.'

In any BDC system, you have one 'master' receiver and some quantity of secondary or 'slave' receivers. The master receiver also serves as the 'powering source' for the LNA and downconverter. If the master receiver is capable of sending power to the LNA and downconverter through wires separate from the coaxial cable that carries the BDC TV signals to the receivers, and there is no tuning or operating voltage on the coaxial cable that carries the signal, you can skip over this part. However, most such systems use the coaxial cable to send TV signals from the antenna to the (indoor) receivers, **and,** they use the **same** coaxial cable to send operating voltages for the downconverter plus LNA outside to the antenna mounted equipment.

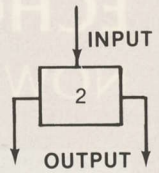
Which brings us back to the splitter, any splitter, that appears in that coaxial line. If the splitter is passing and splitting TV signals from outside to inside, it must also be capable of passing **voltage** from the master receiver to the outside electronics. Can a splitter handle this?

We'll return to that question. There are additional considerations for the splitter as well, shown here in **diagram** form.

1) Is the splitter designed for the correct frequency **range** of the BDC signals (not all splitters cover the spectrum of the BDC 'IF' signals and this is a very important consideration)?
2) Is there some form of 'RF' **isolation** between the output ports, just to be sure that some problem in one receiver does not cause reception problems with the other receivers on the same antenna?
3) Is the splitter designed to **'match'** the cable impedance and type being used in the distribution system (BDC systems in our industry commonly use 75 ohm cable and connectors; check for compatibility before selecting splitters)?
4) Is the splitter designed to **protect itself** against an ingress of moisture (if it will be mounted out of doors, as many are, has it been designed to keep moisture out)?

SPLITTER CONSIDERATIONS

1) IS IT DESIGNED FOR CORRECT FREQUENCY RANGE?
2) IS IT DESIGNED TO "ISOLATE" EACH OUTPUT FROM OTHER OUTPUT(S)?
3) IS IT DESIGNED FOR PROPER "MATCH" TO CABLES UTILIZED?
4) IS IT DESIGNED FOR ENVIRONMENT WHERE IT WILL BE USED?

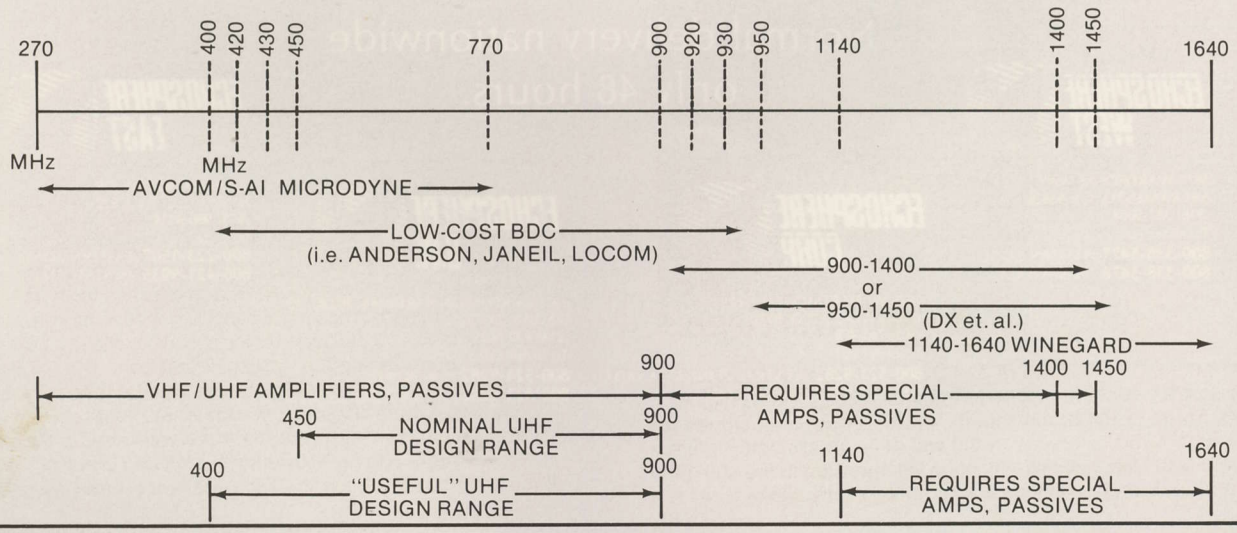


Frequency range first. Different engineers have approached the BDC design from different vantage points and there is a lack of uniformity between BDC suppliers. Not everyone has agreed on the same 'IF' or intermediate frequency range for their products. What does that mean?

The BDC system shifts in frequency the incoming 3,700 to 4,200 MHz (or 3.7 to 4.2 GHz) satellite signals; downward to a lower frequency. The designer is free to select what 'lower frequency range' he likes for his IF (or intermediate frequency). Not all make the same choices. We show that here in graphic form. Note that we have firms such as AVCOM and S/A electing to use relatively low frequencies (270-770 MHz) for their BDC IFs; and at the opposite end we have Winegard selecting a quite high frequency (1,140 to 1,640 MHz) for their BDC 'IF.' As the graphic depiction shows, there are several 'combinations' in use scattered between 270 Mhz as a low frequency and 1,640 MHz as a high frequency.

Obviously an AVCOM BDC that downconverts the TVRO signals to 270-770 is not going to work with a Winegard indoor receiver that tunes 1,140 to 1,640 MHz. But that is the least of your design 'problems.' The very nature of the splitter (or 'passive') devices is that they have an operating frequency 'range.' Splitters are common of course; CATV systems use splitters which are designed to operate from around 5 MHz up to perhaps 450 MHz (although you must always check the specs on a CATV splitter since many have been designed to operate over a lower frequency range such as 5-220 or 5-300 MHz). MATV systems, especially those that carry UHF TV signals 'inband' (between channels 14 and 83, 'on-channel') may be using splitters rated from 470-890 MHz (or 5-890 MHz). Consumer splitters, those

TYPICAL BDC "BANDS"



sold at Radio Shack (et al) typically are rated for VHF and UHF, which means they handle 5 (50) to 250 (VHF) and 470-890 (UHF) **either in** two separate bands (with a 'hole' between 250 and 470) **or** they handle the full region from 50 to 890 MHz.

When a splitter is used 'out of band,' that is, on a frequency or frequency range for which it was **not designed** nor intended, you have reduced performance; rather than 4 dB 'loss' in a two-way split, you may find 14 or 24 dB 'loss' in the 'out of band' portion (or virtually any other undesirable number). Therefore, selecting a splitter which is capable of handling the frequency range presented by your BDC 'IF' is very important.

Note that if you selected splitters rated from 5 (50) to 890 MHz, you would be OK for the AVCOM/S-A/Microdyne BDC IFs in the 270-770 region. But what about the others; those that use 400-900, 430 to 930, 450 to 950, or 900 to 1400? How do you split these signals?

Carefully; very carefully!

The easy ones first; most of the firms offering 900-1400 (or 950 to 1450) MHz IFs are following in the footsteps first laid down by **DX.** And the folks at **DX** realized before they released their products that they would have to supply 'passive' and even 'line amplifiers' in their chosen IF range (originally 900-1400, more recently 950-1450) if they were going to sell their systems. Thus there is a line of **DX** passives (CP-6 power block, DS-772 two-way 'power divider') and DS-774 four-way 'power divider' or 'active passives' (US-3S) which make it possible for all of the equipment using the 900-1400 (950-1450) 'IF region' to survive in the marketplace. We'll look at how the choice of IF (i.e. 270-770 **or** 900-1400) affects the system planning subsequently. For now, be aware that a splitter designed for CATV, MATV or home use will not process signals in the higher IF bands.

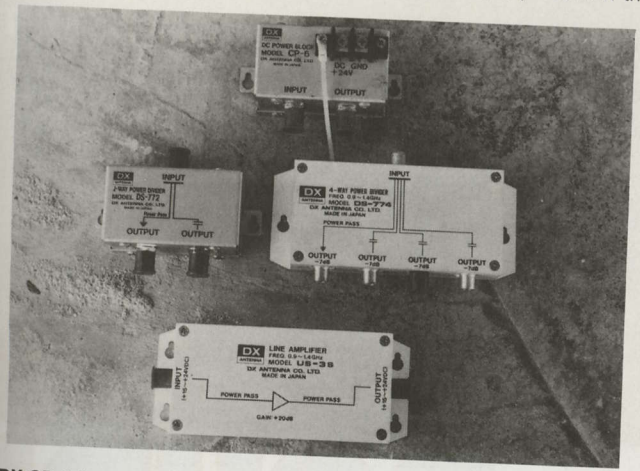
Isolation. Here we are concerned more with interaction between the multiple receivers than interference (such as we might have with single conversion receivers). And, we are also concerned with the way we supply operating power (voltage) to the LNA plus downconverter that services the multiple receivers. Remember that the master receiver will supply power to the LNA plus downconverter through the same cable bringing signal 'inside.' We can split the signal into multiple parts; but what happens to the **power** that is in that line?

We diagram it here for you **(Powering By Cable Considerations).** The RF signal coming indoors is split in two (**one** output port shown) going one way; what is to keep the power, coming into the splitter from the output side, from also going back out the splitter towards the second receiver?

There are two problems here:

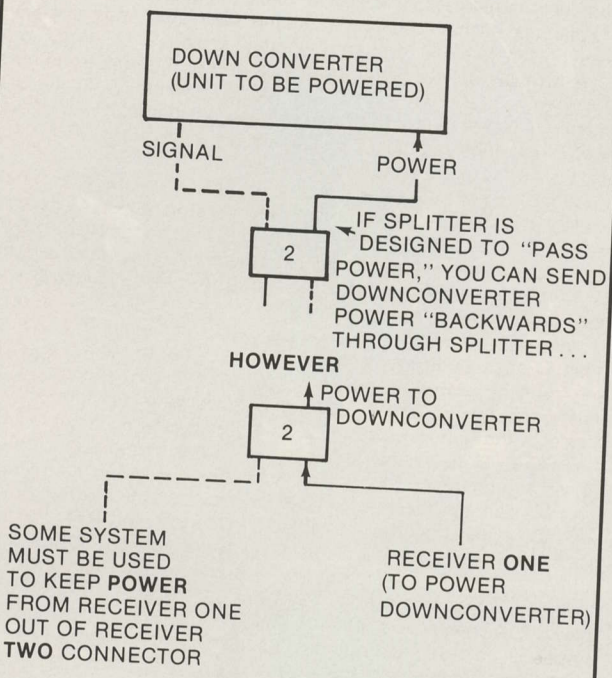
1) If **both** receivers are sending power to the downconverter/LNA, we'll have both sets of power (voltage) present in the splitter. That's bad news; one is enough, two is too many.

2) Even if we have managed to turn the LNA/downconverter power 'off' at the second receiver, the splitter is still apt to feed power/voltage back to the second receiver from the first receiver.



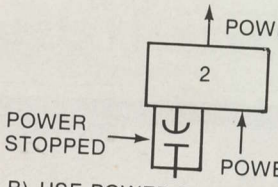
DX CP-6 (top), **DS-772, DS-774 and US-3S are special passive and active devices designed for use in the 900** (950)/**1400** (1450) **MHz region. Some of the better quality MATV products designed for the UHF TV band** (channels 14-83) **will deliver** satisfactory **performance to 940 MHz but virtually** none **will function in the 900-1400 MHz region. Special devices are required or the system will not play!**

POWERING BY CABLE CONSIDERATIONS



WAYS TO KEEP POWER "ISOLATED"

A) USE "DC BLOCK" TO KEEP POWER FROM FLOWING ON LINE



B) USE POWER DIVIDERS/SPLITTERS WITH BUILT-IN POWER BLOCK (i.e. DX)

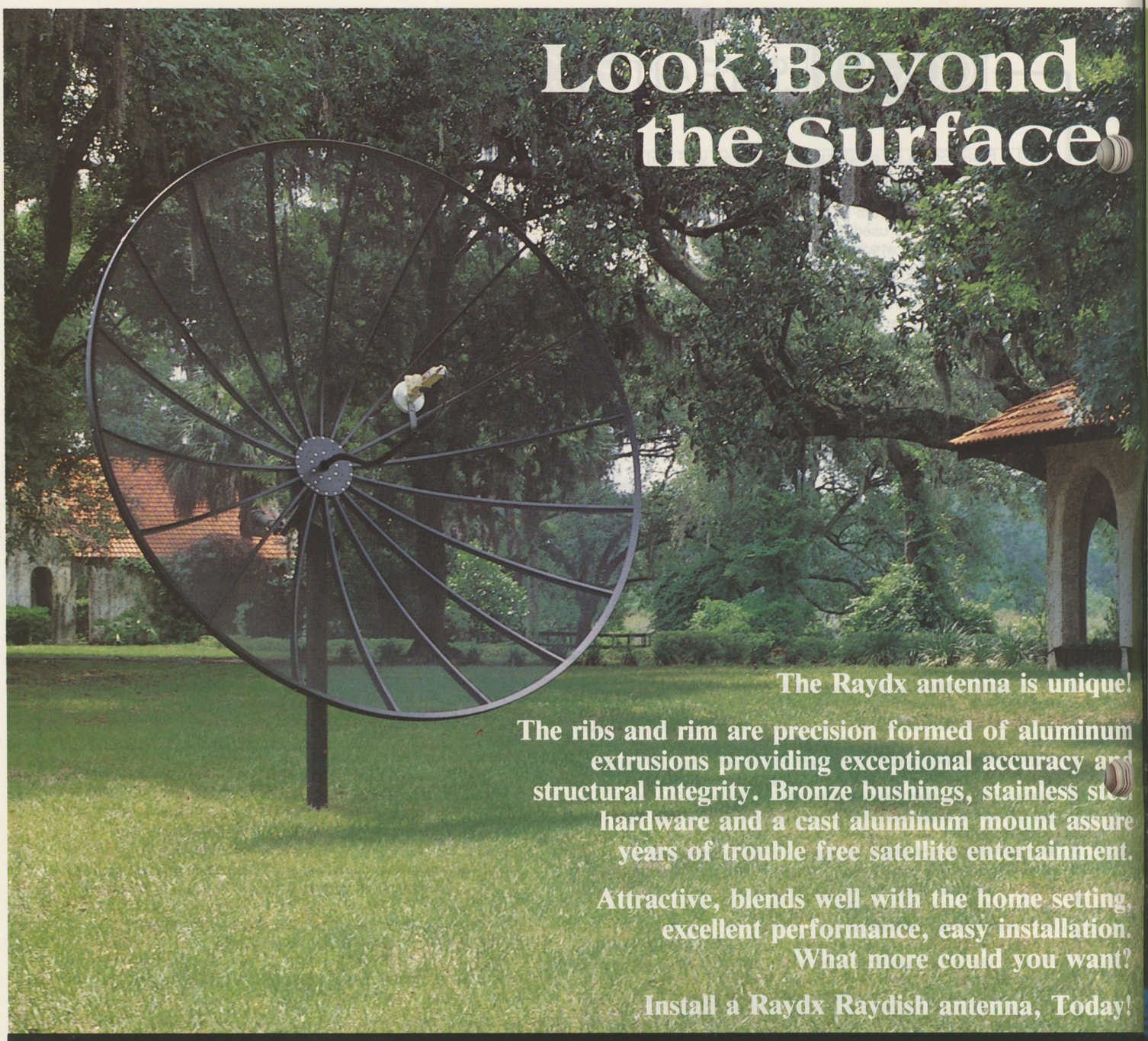
C) SELECT RECEIVERS THAT MAINTAIN **SEPARATE** SIGNAL AND POWER LINES.

There are several answers to this; you have to adopt one of those approaches to avoid powering problems.

1) If your two-way (or four-way, etc.) splitter is not designed for this specialized application, you need to modify it externally with a device called a 'power block.' This is a $5 item at most MATV/SMATV supply houses and it has F connectors on both ends. It inserts 'in-line' at the output of the splitter, in effect 'blocking the power' from leaving the splitter at that port. The RF signals pass through OK, the powering voltage is stopped at the block. If you have three or four (etc.) outputs, you install a power block at all output terminals **except** the one connected to the master receiver (the one that powers the LNA and downconverter). If you adopt this approach, the system is now virtually 'fail safe'; no

INTERNAL WIRING/ continues on page 12

Look Beyond the Surface!



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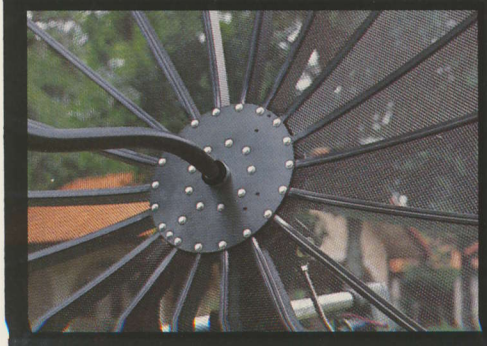

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INTERNAL WIRING/ continued from page 19

matter how a switch at the receiver gets thrown, you cannot accidentally get two (or more) power-voltage sources operating to the LNA plus downconverter. This is the recommended installation technique.

2) You can elect to use splitters with built-in power blocks; the DX DS-772 and 774, for example, have one clearly marked 'power here' output connector and the rest are internally blocked, inside the splitter. This is also a virtually foolproof method.
3) You can very carefully insure that all secondary receivers have their powering switches switched 'off' so no voltage can leak out of that receiver into the 'system' and other receivers.

The problem here is that the customer may accidentally discover and flip that switch one day putting the system out of service.

HOW Much Loss?

The first mistake installers make with planning a BDC distribution system is to overlook the different nature of 'system losses.' Not all losses are created equally!

Let's start with **'Signal Splitting Losses.'** We have a signal source; our downconverter. Traditionally it is installed out of doors at the antenna or at the feed. Connecting it to the receivers we have a run of cable which gets us inside or nearly inside.

Entering our example **(illustrated)** building, we have a two-way splitter to feed two separate lines. Up to this point we have two different losses to consider:

1) The **loss of the cable** from the downconverter to the first two-way splitter, and,
2) The **loss of** the two-way **splitter** itself.

Now we have two different pieces of cable which lead towards a pair of sub-distribution systems. One (to the top of diagram) goes to a second two-way splitter which in turn has additional coaxial cable to receivers **1A** and **1B.** The other goes through cable to a four-way splitter which contributes additional loss, followed by yet additional cable to the four receivers labeled **2A** through **2D.** All of these losses add up, as we shall see.

At this point we have not answered the key question; how do we compensate for these cable and splitter losses to insure that each receiver (1A-1B, 2A-2D) receives the recommended minimum input signal required for quality pictures?

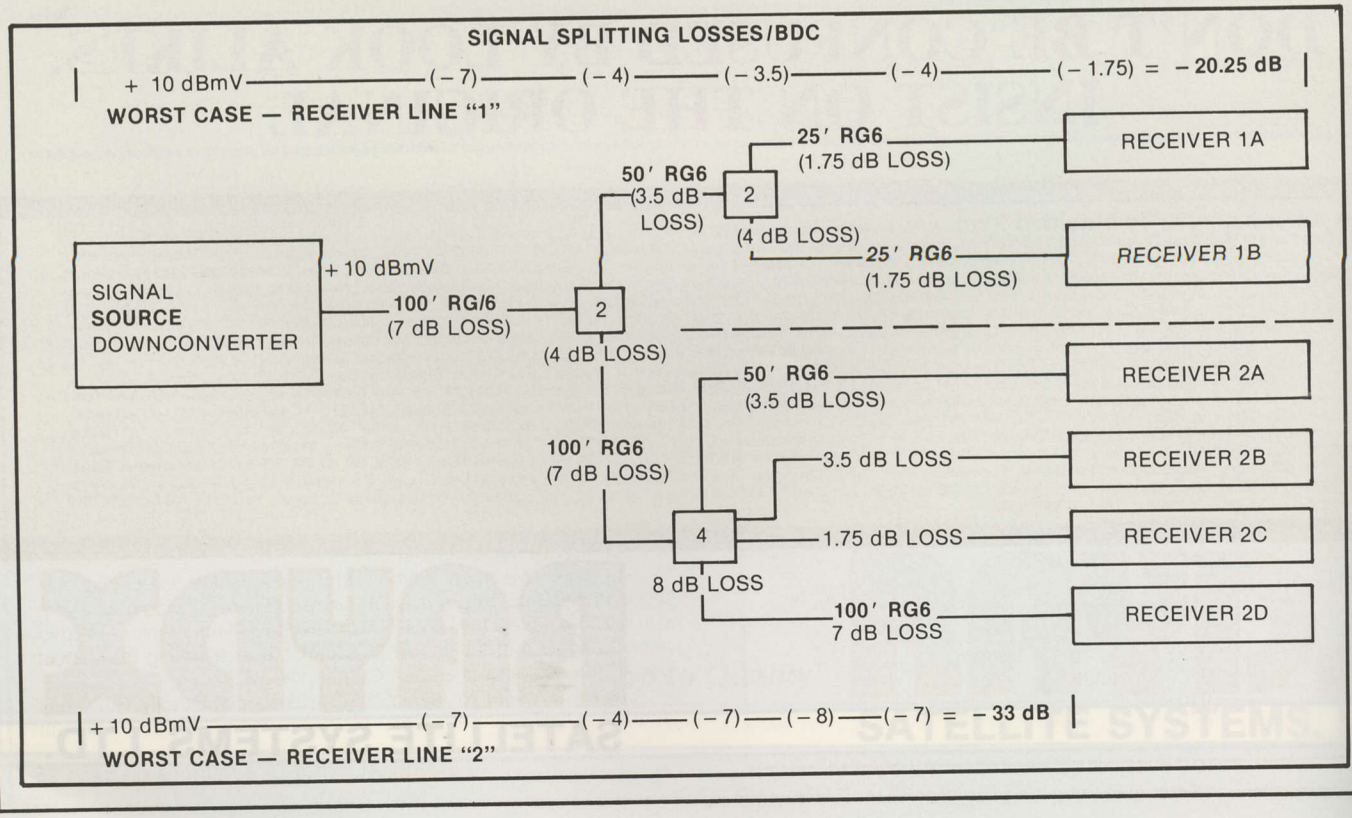
We have several other questions we must first answer.

1) What is the **normalized output** of the BDC (in dBmV)? This will be a number such as +10 dBmV which indicates a certain amount of signal voltage leaving the BDC. We make the assumption that this number is relatively 'flat' or 'equal' across the full BDC band, or transponders 1 through 24. We'll return to that assumption subsequently.
2) How does that output number (+dBmV cited as an example) **change** as a function of antenna system gain? For example, if the number is +10 dBmV in an area such as Kansas with a 100° LNA and a 10 foot dish, what would that level be in Florida with the same dish and LNA? **Chances are it will be lower.** Knowing this is important because of another unanswered question (minimum signal level required to each receiver, at the end of the 'distribution chain').
3) What is the recommended input level to each receiver? The number here will (from manufacturer data sheets) be something like 0 dBmV (the same, you may recall, as 1,000 microvolts). Knowing the recommended level will help us design a system to achieve that level. Not knowing the recommended level will be like going hunting with blinders on; we won't know what we are 'shooting at.'
4) And the worst case situation; what is the **minimum** (as opposed to the recommended) input level for the receivers to be used? Numbers in the −5 to −10 dBmV region are common, but remember that **minimum means** a **degraded picture** and less than full-quality reception for the users.

Reference one more time to 'Signal Splitting Losses/BDC' and notice that in our example we have 20.25 dB of 'loss' in our top ("1") receiver distribution line, and 33 dB of loss in the (worst case) of our "2" receiver line. Those are pretty big numbers, but what do they tell us?

FIRST/ Cable Loss

In the 70 MHz 'IF' (single conversion) receiver world, cable loss characteristics are at most a minor annoyance. They are far more serious a concern when we are dealing with BDC receivers which span 'octaves' of frequency. Let's see why.



SUB-DISTRIBUTION SYSTEM AMPLIFIER GAIN REQUIREMENTS

QUESTION ONE:
"WHAT IS OUTPUT OF BDC (IN dBmV)?

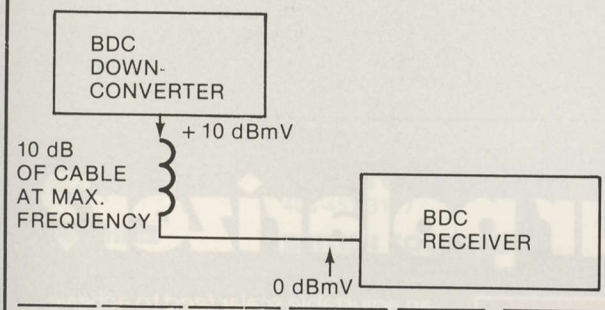
QUESTION TWO:
"HOW IS THAT OUTPUT CHANGED BY SYSTEM GAIN (DISH + LNA) AHEAD OF BDC?"

QUESTION THREE:
"WHAT IS RECOMMENDED INPUT SIGNAL LEVEL TO INDIVIDUAL BDC RECEIVERS?"

QUESTION FOUR:
"WHAT IS **MINIMUM** USEABLE SIGNAL LEVEL BDC RECEIVER(S)?"

'In theory . . .', if we have a BDC downconverter with a +10 dBmV output (signal) level and a receiver (indoors) which must have 0 dBmV to function to its best quality, we can 'lose' 10 dB of signal (+10 minus 10) between the downconverter and the receiver proper. That's theory.

IN THEORY . . .



AT 940 MHz:
1) 10 dB of CABLE = 'S

A) **143'** OF BELDEN
9248
9114
8228
9290
} RG-6

B) **105'** OF BELDEN
8215 — RG 6 A/U

C) **185'** OF BELDEN
8233
8213
} RG-11

D) **115'** OF BELDEN
9145
9275
9243 9274
9266 9240
9100 **8232***
9101
8212
} RG-59

***– 122'**

Cable loss, if there are no splitters in the line from outdoors to indoors, is a function of frequency; higher frequencies have more loss in shorter lengths of cable than lower frequencies. We'll inspect the 'frequency vs. loss' factor shortly.

When we are planning (or pre-checking) a system design, we make all of the 'worst case' assumptions first. That means we add-up **the worst losses,** and those are the losses which occur at the highest frequency in use or being carried by the cable. If the BDC 'IF' is 270-770 MHz, our concern is with the '770 end' since that is where the cable (and therefore, system) losses will be the greatest. If the BDC 'IF' is 440-940, again, 940 is our number of concern.

All cable has loss; a diagram here has selected some of the more popular (Belden brand) cables available through normal jobbers for comparison. We want to know, from the diagram, how much of various types of cable we can 'string out' before we have 10 dB of loss at our highest frequency of interest; in our example, 940 MHz. Note that we have RG-6, RG-6A/U, RG-11 and RG-59 types of cables here. Those appearing in **bold face** are the **best choices** for both loss and cable strength and integrity.

CABLE LOSSES VS FREQUENCY

[EXAMPLES]

CABLE TYPE	AT 440 MHz	AT 940 MHz
9248/RG-6	4.6 dB	7.0 dB
8213/RG-11	3.4 dB	5.4 dB
9266/RG-59	5.7 dB	8.7 dB

(PER 100 FEET OF CABLE)

Well, if we know what our cable loss per foot is (at the frequencies of interest), and we know how many splitters and what types of splitter we will be utilizing, are we now getting close to specifying some type of 'amplifier' to overcome those BDC distribution system losses? Close, but we have some more homework to do. In our **'Amplifier Selection'** diagram, we walk through the example system; 33 dB of loss on the longest receiver run and a minimum input to the 'most cable distant' receiver of 0 dBmV. We started out with a +10 dBmV from the downconverter, so we can now compute at least the **gain** requirement for the amplifier:

1) +10 dBmV (downconverter output) minus (–) 33 dB of system loss equals (=) minus 23 dB. Remember that 0 dBmV is not representing 'no signal'; in the dBmV world it represents the 'recommended input' to a receiver; anything **greater than** 0 dBmV (or 1,000 microvolts on a 75 ohm coaxial cable line) is represented by 'plus' (+) signs and anything **lower than** this is represented by a 'minus' (–) sign. This is handy because when we see –4 dBmV written out, or on a meter scale, we instantly know we are 4 dB lower than the recommended input level.

Our 'Amplifier Selection' diagram shows us that if we insert a 23 dB gain (or 23 dBg) amplifier after the signal source (downconverter) we will now have a +33 dBmV output. That means that as we wind through the example system, we will end up at the receiver 2D location (our most distant receiver) after 33 dB of system loss with 0 dBmV. Is that all there is to selecting an amplifier; knowing how much gain we need to overcome the losses?

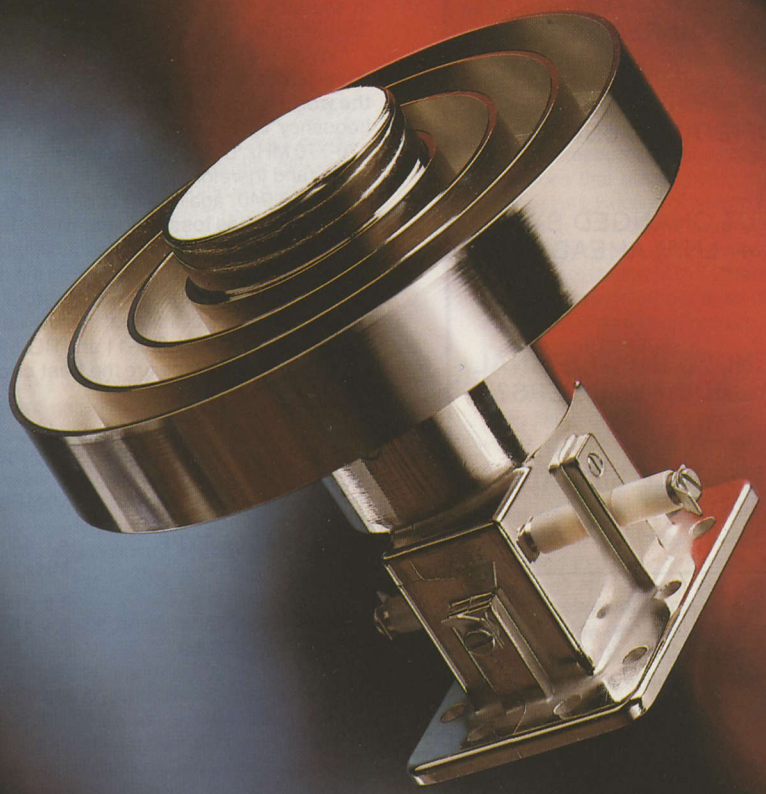
AMPLIFIER Selection Parameters

Not quite. We need to know that our amplifier will provide the required gain (more is usually OK since inside of individual receivers you typically have a gain control in the IF you can turn down). We **also** need to know that the amplifier is capable of handling the 'output power' our system will create. Output power?

Say the amplifier you select has 23 dB of gain. Exactly. But, it has another specification as well; 'Maximum output capability / +30

INTERNAL WIRING/ continues on page 25

YOUR TVRO SYSTEM IS STATE OF THE ART.



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Part # 4850-4004-00

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M/A-COM Omni Spectra

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INTERNAL WIRING/ continued from page 23

dBmV.' Let's see, if we start with +10 dBmV and we have 23 dB of gain, that's a total output of +10 and 23 or +33 dBmV. Ooops. That is 3 dB more than the manufacturer rates the amplifier for. Is that bad?

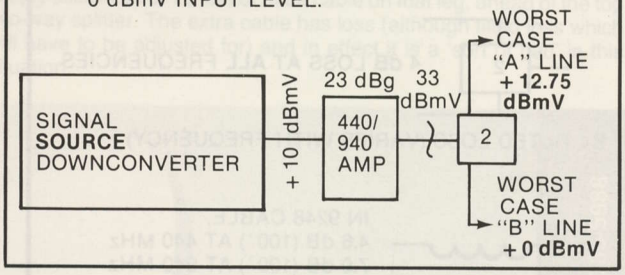
It is, because when an amplifier's input signal (+10 dBmV in our example; it could be higher of course) plus the gain of the amplifier adds up to a new number which is **greater than** the output capability specified, the amplifier adds distortion to the signals. They no longer are amplified properly and they become distorted in the amplifier. This is why you cannot stick an unlimited number of 23 dB gain amplifiers in 'series' (i.e. one right after the other) to get a 'super output level'; at some point the input of one plus the gain of the amplifier will add up to some number greater than the output capability of the amplifier (transistors). Not good. And something to be mindful of.

AMPLIFIER SELECTION

1) FROM EXAMPLE SYSTEM, WE HAVE WORST CASE LOSS OF 33 dB (–33 dB) AND A DOWNCONVERTER OUTPUT OF +10 dBmV.

2) MINIMUM RECOMMENDED SIGNAL TO RECEIVERS IS 0 dBmV (aka 1,000 MICROVOLTS).

3) + 10 dBmV MINUS (–) 33 dB = –23 dB;
   A) THEREFORE WE REQUIRE AT LEAST 23 dB OF AMPLIFIER GAIN TO BRING OUR WORST CASE RECEIVER (2D IN EXAMPLE) BACK TO 0 dBmV INPUT LEVEL.



AMPLIFIER SELECTION PARAMETERS

1) AMPLIFIER **MUST:**
   A) HAVE REQUIRED GAIN
   B) BE CAPABLE OF HANDLING OUTPUT POWER REQUIRED
   C) BE 75 OHM INPUT/OUTPUT
   D) COVER REQUIRED FREQUENCY RANGE (i.e. 270-770; 400-900/430-930/ 440-940, 900-1400/950-1450, 1140-1640)
2) AMPLIFIER **SHOULD:**
   A) BE CAPABLE OF BEING CABLE POWERED
   B) HAVE TILTED GAIN CIRCUITS
   C) HAVE MANUAL GAIN CONTROL

Of course the amplifier should be 75 ohm, with appropriate coaxial cable fittings (300 ohm home-style amplifiers are to be avoided!). And the amplifier **must cover** the intended frequency range of the system; such as 440 to 940 MHz. It would also be nice if the amplifier was capable of being cable powered by the power supply in your receiver (right voltage, little enough current that the receiver can handle the new, extra load) and it had a manual 'gain control.' There is nothing to be gained by operating the amplifier at more gain than your system requires; if your layout calls for a 20 dB amplifier and the one you select has 23 dB of gain, it would be best to be able to turn down the gain 3 dB to the 20 dB required; just to keep everything operating as it should. And it would be nice if the amplifier had a 'tilt' control.

Tilt?

That may be a new term to you.

Remember that our cable losses vary with frequency; more or greater cable losses at higher frequencies. However, our splitter

losses are independent of frequency; if the two-way splitter has 4 dB of 'split-loss' at 440 MHz, it should be expected to have 4 dB of 'split-loss' at 940 MHz too. That means we really have two types of loss at work here and we'll study that sub-problem shortly.

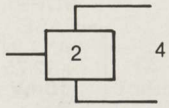
We ran through our example system by adding up the losses for the longest cable (plus splitter loss) 'legs' in the miniature distribution system example originally given. We also took the 'worst case losses' for our cable portion, and those were the losses at the highest frequency part of the BDC 'IF band.' Our example used a 440-940 MHz IF, which is similar to those for **Anderson, Janeil, Locom** and **TX Engineering** 'low cost' BDC equipment. The loss figure we used in our calculations, for the cable, was 7.0 dB per 100 feet **at 940 MHz** (RG-6 type cable).

But the loss **at 440 MHz,** in the same 100 feet of cable, is **4.6 dB;** not 7.0 dB. How do we handle that? Do we worry about the difference?

WHAT ABOUT CABLE 'TILT'?

PROBLEM:

1) BECAUSE CABLE LOSSES VARY WITH FREQUENCY, OUR 'WORST CASE' EXAMPLES ARE FOR LONGEST CABLE RUNS (GREATEST LOSSES) AT HIGHEST FREQUENCY (940 MHz IN EXAMPLE).
2) EACH SYSTEM HAS TWO TYPES OF LOSSES:
   A) FLAT LOSS (SAME REGARDLESS OF FREQUENCY) FROM DEVICES SUCH AS SPLITTERS:



4 dB LOSS AT **ALL** FREQUENCIES

   B) TILTED LOSS (VARIES WITH FREQUENCY)

IN 9248 CABLE,
4.6 dB (100') AT 440 MHz
7.0 dB (100') AT 940 MHz

In a short-run system, or in a short system where there is as much or more splitter loss as cable loss, worrying about the 'difference' between loss at the high end of the IF range and loss at the low end may not be worth the time and trouble. If you can end up at your worst-case receiver with no more than 3 dB of difference between the high end (greatest loss) signal and the low end (lowest loss) signal, forget about it. But as you use more and more cable and the difference between the two extremes becomes greater than 3 dB, pay attention to 'equalizing cable tilt.'

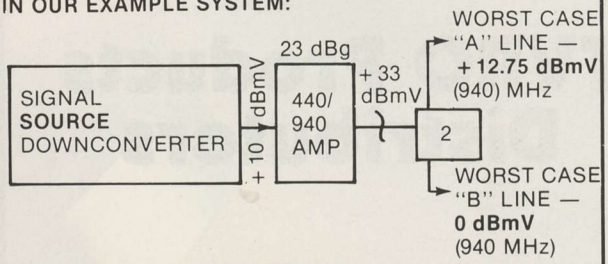
Some amplifiers have a 'tilt control.' That means they rate themselves for the maximum gain at the highest frequency (such as 23 dB gain at 940 MHz). Then they provide a control, adjustable by the installer, which changes the gain towards the low(er) end of the band. **It lowers the gain for the low end** because **the cable loss is also lower there.** There is a 'tilt range' of so many dB and when you adjust that tilt control the gain at the high end stays fixed (stable) while the lower end portion reduces.

Some **'Cable Losses vs Frequency'** are shown here for example cables. Note that the highest loss cable (RG-59/U) also has the greatest 'tilt-difference'; 3.0 dB per 100 feet with the 9266 Belden cable used as an example. This is dangerously close to worrying about the tilt in a 100'-plus simple system that only has a single receiver attached to the downconverter and antenna; a case to remember.

If you allow the tilt to 'take over' without 'equalizing' it, you will find that in a 'stretched system' the low end channels (TRs in the 1-7 or so region) look good while the higher end transponders (in the 17-24 region) don't look as good. That's because the cable losses are higher in the high frequency end, and there is simply less signal arriving at the (indoor) receiver at TR24 than there is at TR1.

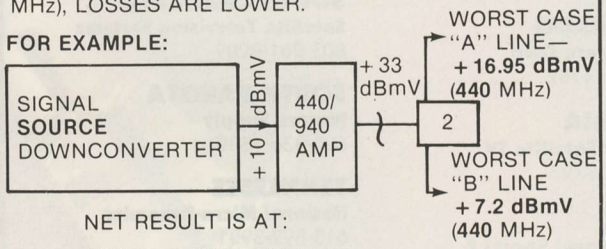
EFFECTS OF CABLE TILT

IN OUR EXAMPLE SYSTEM:



HOWEVER, WORST CASE LOSSES (LONGEST RUN, HIGHEST FREQUENCY) ARE SUM OF SPLITTER + **GREATEST** CABLE LOSSES. AT SAME WORST-CASE RECEIVER LOCATIONS, AT LOWEST FREQUENCY (440 MHz), LOSSES ARE LOWER.

FOR EXAMPLE:



NET RESULT IS AT:

WORST CASE "A" LINE—
1) 440 MHz = + 16.95 dBmV
2) 940 MHz = + 12.75 dBmV

WORST CASE "B" LINE—
1) 440 MHz = + 7.2 dBmV
2) 940 MHz = 0 dBmV

In our **'Effects Of Cable Tilt'** illustration, we see what happens in our earlier system example if we simply select an amplifier with 23 dB of gain (as required by our example) but with no 'tilt equalization' adjustment, or built-in (non-adjustable) tilt. In the top, we end up with a signal of **+ 12.75 dBmV** at receiver number **1A** (1B) while we end up with a signal of **0 dBmV** for receiver **2D.** That's at the highest frequency; 940 MHz. What about the same two locations, after the cable and splitter losses, at the low frequency end; 440 MHz?

If you compute the losses you find (as the bottom of the illustration depicts) that we have + 16.95 dBmV of signal on TR1 for receiver 1A and + 7.2 dBmV of signal for TR1 (440 MHz) at receiver 2D. Obviously these could be 'problem numbers' since we have exceeded the recommended 3 dB 'flat' difference.

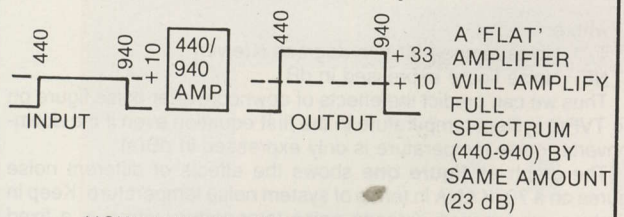
A cable amplifier with tilt, on the other hand, can partially or totally correct this situation as shown in **'Cable Tilt Solution'** here. In the top, we have a graphic representation of the 'flat' + 10 dBmV input signal from the downconverter (we assume the downconverter puts out + 10 dBmV on all transponders; an 'ideal situation' seldom found in the real world). After the amplifier, the output signals are + 33 dBmV, again 'flat' (i.e. not tilted).

On the bottom of the illustration, we have the same process with a 'tilt equalizer' control on the amplifier. Now we have + 10 dBmV input signal 'flat' across the input band and at the output we have a tilted-gain output with + 33 dBmV output at the **top** end (940 MHz/TR24) while at the low end the output has been 'tilt-reduced' to + 25 dBmV. That is 8 dB of 'difference' and we would describe the system as having **'8 dB of tilt.'**

Return now to our 'Effects Of Cable Tilt' example; at the receiver 1A/1B locations we had + 12.75 dBmV on TR24 and + 16.95 dBmV at transponder 1. By adding in the 8 dB of tilt, we will end up with + 12.75 dBmV on TR24 and 8.95 dBmV on TR1. That's just under 4 dB of tilt difference.

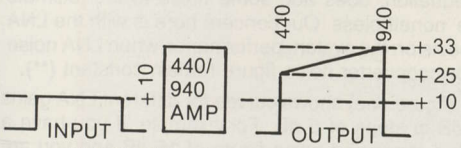
However, in the receiver 2D location, we originally had + 0 dBmV on TR24 and + 7.2 dBmV on TR1. Now after the 8 dB of tilt we have 0 dBmV on TR24 and − 0.8 dBmV on TR1. These are 'better' numbers but are they the best we can do?

CABLE TILT SOLUTION . . .
[IS AMPLIFIER TILT]



A 'FLAT' AMPLIFIER WILL AMPLIFY FULL SPECTRUM (440-940) BY SAME AMOUNT (23 dB)

HOWEVER, IF AMPLIFIER HAS BUILT-IN "TILT" CONTROL . . .



. . .THEN THE OUTPUT CAN BE ADJUSTED TO "COMPENSATE" FOR UNEVEN CABLE LOSSES TO ASSURE **NEAR-FLAT** SIGNAL DELIVERY LEVELS TO RECEIVERS AT END OF BDC DISTRIBUTION SYSTEM.

Remember the tilt control is adjustable, by the installer. Given some way to know what is happening when the tilt control is adjusted (i.e. some method of measuring the effects of the change) we could find a 'happy medium' where with say 5 dB of tilt adjusted into the system we would have:

1) Receivers 1A/1B: TR1 at +11.95 dBmV and TR24 at +12.75 dBmV;

2) Receiver 2D: TR1 at +2.2 dBmV and TR24 at 0 dBmV.

Now we have met the original goal of staying at 0 dBmV input signal level to each receiver on the system and also of staying within 3 dB of the same number with TR1 and 24 (extremes) levels into any receiver. Is the system now ready to 'build'?

Almost.

Note that because we required the 23 dB of gain amplifier to make it to the 2D receiver location (and lesser amounts for closer receivers), we now have an abundance of signal at the closer receivers; numbers 1A and 1B. Is that +12 dBmV 'region' signal going to be a problem? problem?

Most receivers ask for 0 dBmV (again, always check the manufacturer's specs or ask him if they are not printed in your manual). Most receivers, even in the low-cost BDC region, have internal (or external/rear-panel) 'IF Gain' controls. What you need to know is whether or not the 'range' of the gain control will handle the relatively 'hot' +12(.75) dBmV signal. If it will not, there is a quick fix; simply install an appropriate in-line pad (signal attentuator) with say 6 or 10 dB of 'pad value' at the **input** to the top two-way splitter that divides the signal for receivers 1A and 1B. The pad needs to be frequency rated to the highest frequency you intend to use; be careful, many CATV pads don't work very well (if at all!) at 940 MHz. The effect is just like using a splitter that is only rated to say 500 MHz; the high end signals disappear into the noise while the low end signals look pretty good.

There is one more 'trick' that has saved many an installation; simply stick in 50 or 75 feet of extra cable on that leg, ahead of the top two-way splitter. The extra cable has loss (although tilted loss which will have to be adjusted for) and in effect it is a 'sort of pad' in this situation.

LNA SQUABBLE: How Much Gain IS ENOUGH?

At the present time within the TVRO industry there is considerable controversy surrounding the question of 'gain' for the LNA portion of a TVRO receiving system. Just how much gain is required? Should it be 40 dB? Is 44 dB of gain the absolute minimum? What ever happened to 50 dB gain?

In the very early days, the 'backyard' satellite industry used essentially the same LNAs as one found in the commercial end of the business. There were simply no other LNAs available; they ALL had 50 to 55 dB of gain and noise temps in the 120 degree and up region. The reason they had 'so much' gain? Quite simply, virtually all of the downconverters placed into service in that era were **inside of the actual TVRO receiver.** This meant the typical installation had from 50 to 200 feet of '4 GHz microwave hardline cable' running from the LNA to the receiver; i.e. the downconverter location. This translates into roughly 10 to 40 dB of 'loss' if you substituted RG-213 cable for the microwave hardline.

Modern TVROs do not have this type of system design, nor the added system loss. To be cost competitive in the consumer marketplace, the long RG-213/U cable has been eliminated and the downconverter has been placed either at the LNA proper or a short distance away (such as directly behind the dish).

More cable equals more loss. And cable loss equals a higher noise figure for the downconverter. So the worse the downconverter noise figure, the more gain we require to insure that THIS noise (figure) source will not degrade the system noise figure which we hope is established by the LNA.

So how much gain is required?

This can be easily calculated. The system noise temperature (figure) is a function of the LNA noise temperature, and the LNA gain, and the equivalent noise figure of whatever electronic stages follow the LNA. This is expressed by math as follows:

$$T_{sys} = T_{lna} + T_{dc}/G_{lna}$$

where:

T_{sys} = system noise temperature

T_{lna} = LNA noise temperature

T_{dc} = Downconverter noise temperature + cable loss temperature

G_{lna} = LNA gain expressed as a ratio (**not** dB)

Now, when you are dealing with very high noise temperatures (i.e. high noise figures), it is actually more convenient to speak of noise **figure** instead of noise temperature. A 70° LNA has a noise figure of 0.94 dB, just as one example. Most well designed downconverters will have a noise **figure** between 8 and 12 dB **(*),** or, 1540° to 4300°. Unfortunately, some downconverters will run poorer noise figures, such as 15, 20 or even 25 dB. And remember, cable loss between the LNA and the downconverter adds additional noise to the equation.

by
Dave Moore
Microwave Systems Marketing
P.O. Box 9541
O'Fallon, Mo. 63366

The conversion, from noise **figure** to noise **temperature** is:

$$T = 290\ (10^{NF/10} - 1)$$

where:

T = Noise temperature, in degrees K(elvin)

NF = Noise figure expressed in dB

Thus we can predict the effects of downconverter noise figure on the TVRO system temperature in the first equation even if the downconverter noise temperature is only expressed in dB(s).

The graph as **figure one** shows the effects of different noise figures on a 70° K LNA in terms of system noise temperature. Keep in mind we are ignoring antenna noise temperature which is a fixed quantity for a given antenna at a given look angle elevation; but which, in the full system equation, does add some noise to the 'ultimate system temperature' nonetheless. Our concern here is with the LNA gain, and how it impacts on the system performance when LNA noise temperature and downconverter noise figure remain constant **(**).**

The graph here (figure one) shows curves for different LNA gains from 25 dB to 55 dB in steps of 5 dB. For example, if you have a downconverter with a measured noise figure of 15 dB and you are using it with an LNA rated at 70° K, the crossing point is at 79° K. That means the low (30 dB) gain LNA costs you 9 degrees in LNA effective temperature. On the other hand, if the downconverter has a noise figure of 26 dB (see **CSD/2** for June 15th and tests performed on new STS-MBR receiver; editor), and you tried to use a 30 dB gain LNA with that receiver, you cannot even find the real noise of the LNA on this chart. It is so far above the chart, it appears to be in the next county. You would have to use an LNA with at least 42 dB of gain to equal our original 79° K example (30 dB gain with 70° K LNA).

So how much gain is enough? It is the belief of this writer that there is very little (if indeed any) discernable difference in a **10° increase** in system noise; so let us set that as a limit. Let's also assume a downconverter noise figure of 14 dB. Using a 40 dB gain LNA, as an example, we can have a system with as much as 25.4 dB in **packaged noise figure,** according to figure 1, and still make our 80 degree (70 + 10) limit. If we start with our 14 dB converter noise figure, and we see by figure 1 that we can have 25.4 dB of **total noise,** that means we can ADD 11.4 dB (25.4-14) in cable loss between the LNA and the downconverter and still meet our objectives (RG-213/U has .22 dB of loss per foot at 4.2 GHz which works out to 52 feet of cable). A shorter cable run (15 feet for example) would yield a lower packaged noise temperature (72°K in the case of 15 feet of 213).

The name of the game is picture quality as determined by the carrier-to-noise ratio. C/N is a function of the system noise temperature. It would appear that there is little to be gained by going to higher gain LNAs once we have obtained sufficient gain to 'overcome' the noise contribution of the downconverter. You could, however, have problems if you were using a 'low gain receiver' or one designed with a limited 'dynamic range' built to be used with 50 dB gain LNAs (only). Many (most) receivers do have a dealer-accessible IF gain control (typically inside the receiver located on the IF board), or a wide

*/ **Editor's note:** That downconverters actually did have noise figures in the 8 to 12 dB region! Of several dozen quantified by CSD in recent lab tests, **none had** noise figures **under 12 dB** and several had noise temperatures as high as 28 dB. We suggest readers interested in putting the equations and table here to field practice assume that even the best of the mass produced units will average a 15 dB noise figure across the 3.7 to 4.2 GHz band and those that are not so good will be as much as 10 dB 'noisier.'

**/ Downconverter noise temperatures/figures measured by CSD in the lab often vary widely between transponder 1 (3.7 GHz) and transponder 24 (4.2 GHz). It is not unusual to find a downconverter which has a noise figure that varies from 3 to 5 dB over the 3.7-4.2 GHz band. In those portions of the band where the noise figure is high, you get 'grainy pictures' while in those portions where the noise temperature/figure is lower, you get high quality pictures. This is almost always a function of downconverter noise figure although LNA variations could in theory also produce the same result.

LNA SQUABBLE/ continues on page 33

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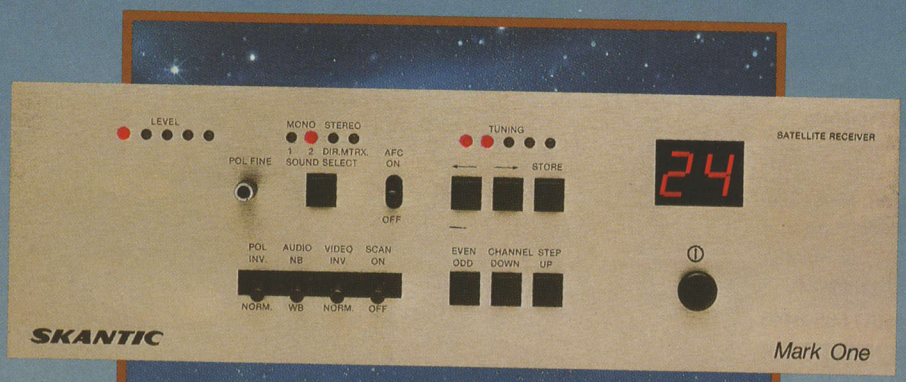

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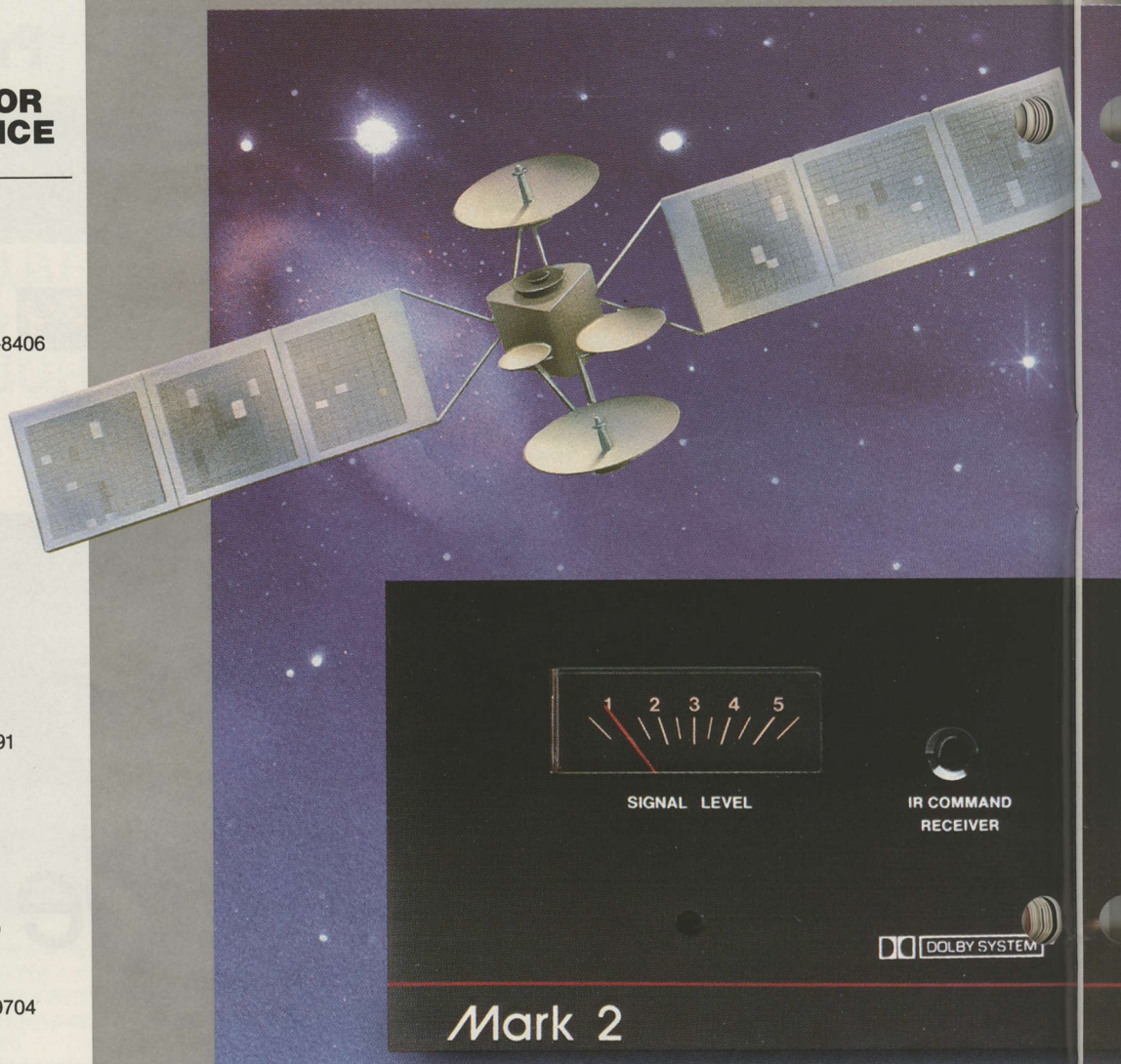

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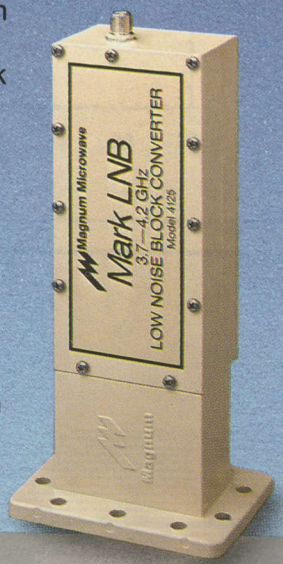

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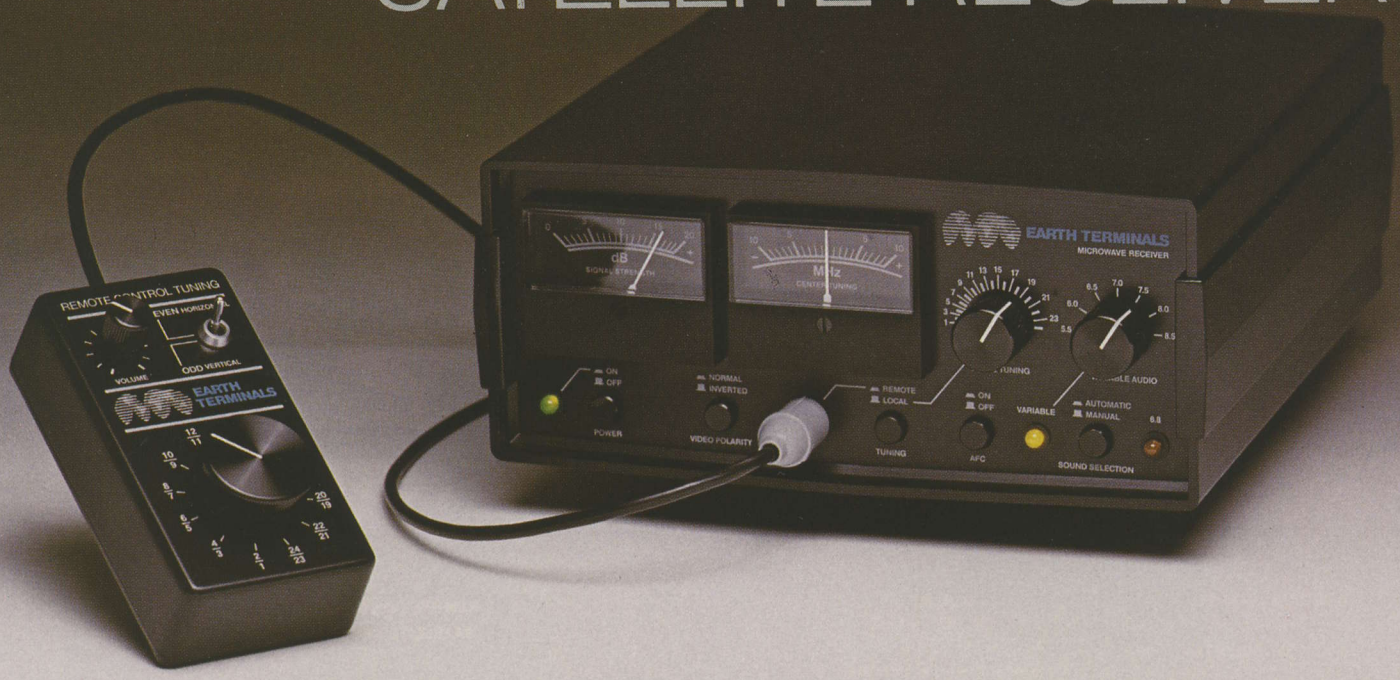

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Dual conversion circuitry and a remotable downconverter permit multiple receiver systems with a single antenna. (Less sophisticated single conversion receivers require costly interference isolaters.)

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LNA SQUABBLE/ continued from page 28

(automatic) gain control (AGC) range on their own and for these receivers a 40 dB gain LNA **should not be** a problem.

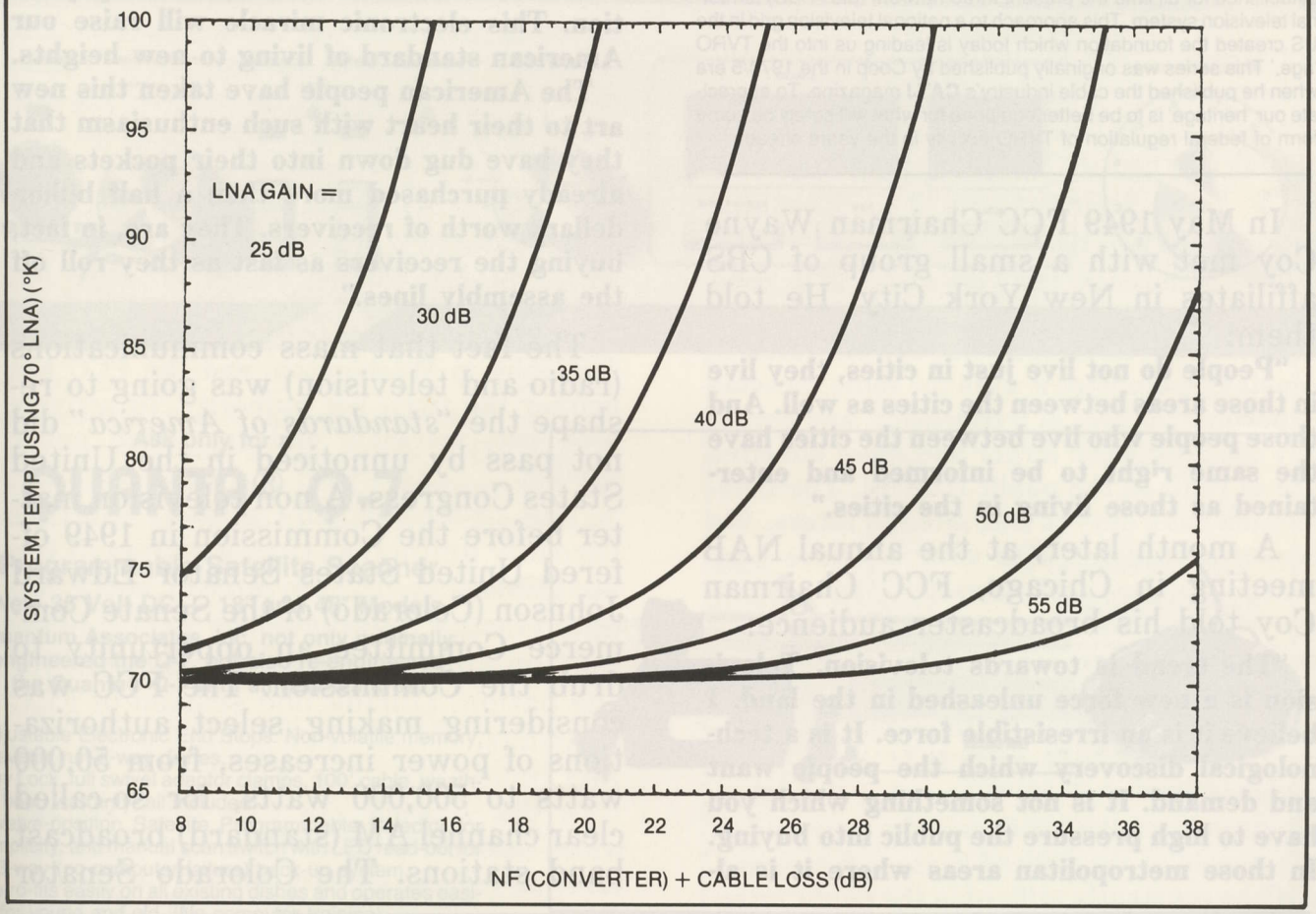
However, a low-gain receiver will show 'more sparklies' when connected to an LNA with insufficient gain. This is **not** a carrier to noise nor a noise temperature problem; it is simply a problem of providing adequate signal power to properly drive the FM demodulator inside of the receiver proper. A well-designed receiver will not have this type of problem; it is far less expensive, to the consumer-user, to have gain at the 70 MHz IF than at the 4 GHz LNA.

In conclusion, it is seen that LNA gain is not a major factor in TVRO system performance if the receiver has a sufficient dynamic range **(***).** The lower gain (and less expensive) LNAs will provide the end user as well as the dealer with cost-savings since the LNAs can be built using fewer of the expensive microwave stages **(****).** This tech note provides a means so that the dealer can determine what effects LNA gain may have on system performance.

***/ Moore is correct, as far as he goes. Unanswered, however, is the effects caused by leaving the isolator out of the low-cost LNAs thereby placing the first GaAs-FET LNA stage 'directly coupled' to the antenna itself. Field tests **strongly suggest** that some antenna surfaces, and feeds, do create impedance unbalanced conditions in some segments of the TVRO band causing the LNA's apparent noise temperature to vary widely when the LNA is connected to an antenna. Much more work, and measurement, remains to be done in this area, in our estimation **(editor)**.

****/ At the OEM level, a handful of GaAs-FETs to build a complete 50 dB gain LNA are not **that expensive** anymore. We were recently given a set of 5, capable of building a 70 degree K LNA, which were purchased in Japan for $25 (for the complete set). Less than four years ago, a SINGLE high quality GaAs-FET capable of producing an LNA with a noise temperature in the 120 degree range cost as much as $300. Mass production changes all cost relationships **(editor).**

FIGURE 1. EFFECT OF LNA GAIN ON NOISE



TVRO & CSD/ OUR SIXTH YEAR!

ROOTS OF TVRO (Part 15)

THIS SERIES traces the history of television broadcasting and regulation in the United States. The present TVRO 'boom' is directly fueled by the decisions of the FCC in the 1948-60 era; decisions which established for all time the present three-network (plus PBS) terrestrial television system. This approach to a national television grid in the US created the foundation which today is leading us into the TVRO 'age.' This series was originally published by Coop in the 1974/5 era when he published the cable industry's **CATJ** magazine. To appreciate our 'heritage' is to be better equipped for what will surely be some form of federal regulation of TVRO activity in the years ahead.

In May 1949 FCC Chairman Wayne Coy met with a small group of CBS affiliates in New York City. He told them:

"People do not live just in cities, they live in those areas between the cities as well. And those people who live between the cities have the same right to be informed and entertained as those living in the cities."

A month later, at the annual NAB meeting in Chicago, FCC Chairman Coy told his broadcaster audience:

"The trend is towards television. Television is a new force unleashed in the land. I believe it is an irresistible force. It is a technological discovery which the people want and demand. It is not something which you have to high pressure the public into buying. In those metropolitan areas where it is already available, it has met with sensational acceptance.

But don't think that the people outside the metropolitan areas are going to be content to grow old gracefully, while TV passes them by. The day of the hinterland, the provinces, the backwoods, and the 'sticks' of America has passed."

Chairman Coy, an inexhaustible public speaker, appeared next before the New York Rotary Club where he said:

"Television is a revolutionary new type of broadcasting. It will speed our industrial processes, facilitate our merchandising methods, stimulate and inform the mass of our population. This electronic miracle will raise our American standard of living to new heights.

The American people have taken this new art to their heart with such enthusiasm that they have dug down into their pockets and already purchased more than a half billion dollars worth of receivers. They are, in fact, buying the receivers as fast as they roll off the assembly lines."

The fact that mass communications (radio and television) was going to reshape the *"standards of America"* did not pass by unnoticed in the United States Congress. A non-television matter before the Commission in 1949 offered United States Senator Edward Johnson (Colorado) of the Senate Commerce Committee an opportunity to drub the Commission. The FCC was considering making select authorizations of power increases, from 50,000 watts to 500,000 watts, for so-called clear channel AM (standard) broadcast band stations. The Colorado Senator

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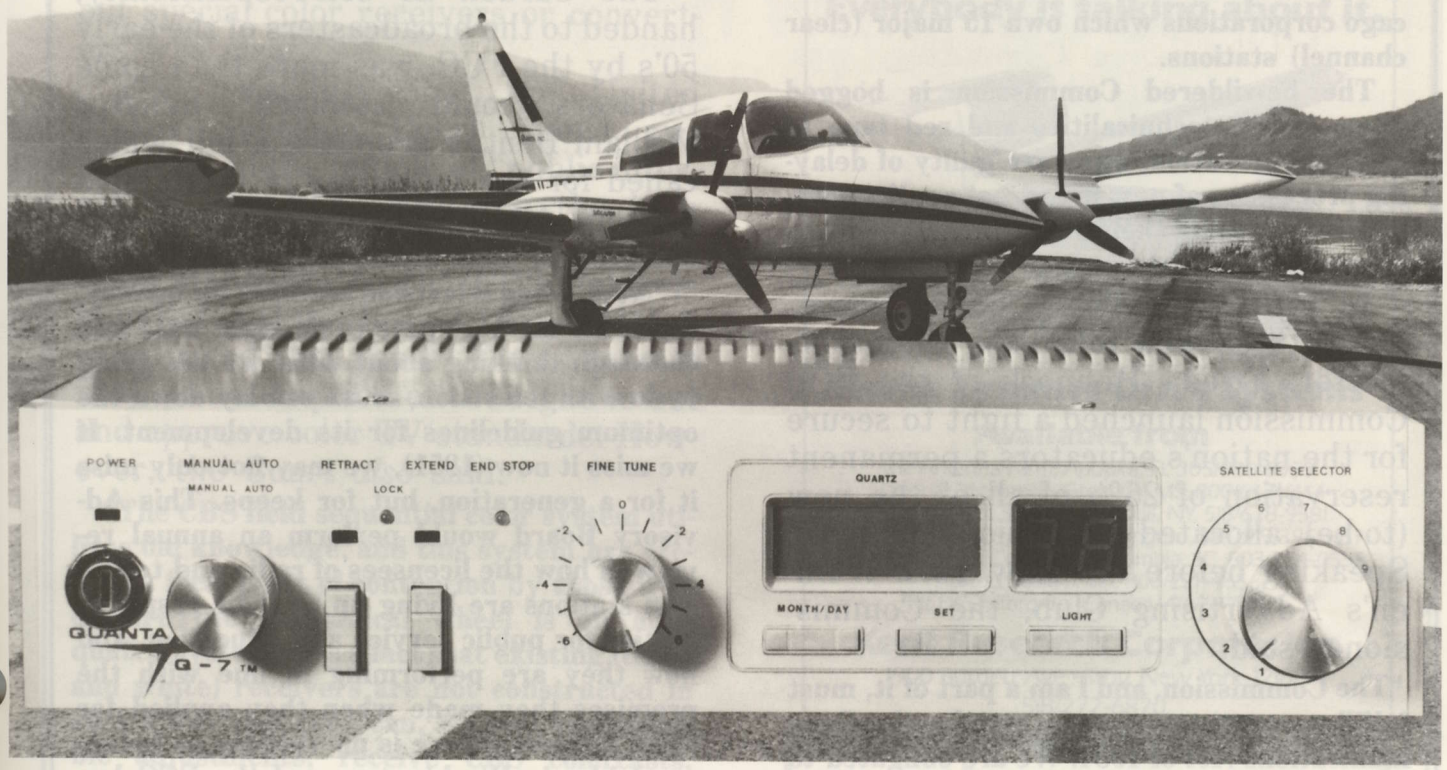

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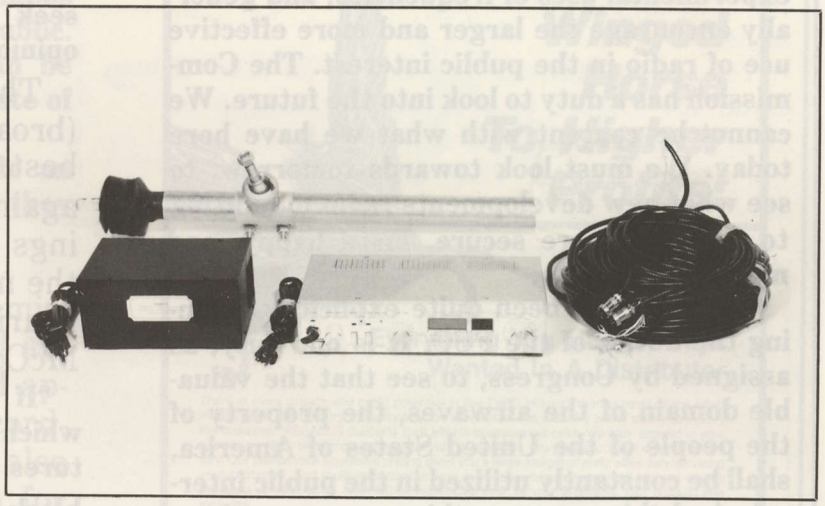

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said:

"Such an action by the Commission will concentrate control of the (broadcasting) industry in three or four New York and Chicago corporations which own 15 major (clear channel) stations.

The bewildered Commission is bogged down in the technicalities and red tape of their own creation. They are guilty of delaying processing of new broadcast applications, and of bypassing their own regulations when it suits them to do so."

In 1951, while the FCC was wrestling with the new television allocations matter, Frieda Hennock of the FCC Commission launched a fight to secure for the nation's educators a permanent reservation of 25% of all of the new (to-be) allocated television channels. Speaking before the New York Women's Advertising Club, the Commissioner said:

"The Commission, and I am a part of it, must fulfill our statutory mandate under the Communications Act of 1934. We are obligated to constantly study new uses for radio, provide experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest. The Commission has a duty to look into the future. We cannot be content with what we have here today. We must look towards tomorrow, to see what new developments radio may bring to make us more secure, more happy, and more comfortable.

Congress has been quite explicit in defining the duties of the FCC. It is our duty, as assigned by Congress, to see that the valuable domain of the airwaves, the property of the people of the United States of America, shall be constantly utilized in the public interest. And this means nothing more, nor less, than those uses shall be for the benefit of the people of the United States.

The burden for the improvement of the quality of American broadcasting lies squarely on the shoulders of the public and the broadcasters. Every citizen must take broadcasting seriously, for it will, in any event, have a great effect on our lives and the futures of us all."

The burden of self-responsibility, handed to the broadcasters of the early 50's by the FCC, was more than some Senators could stomach. Senator William Benton proposed a bill which called for the formation of a National Citizens Advisory Board on radio and television. The Senator said:

"Now, when television is still in its infancy, would be the best time to do some wise and thorough thinking about what we are going to do with television, so we can lay down the optimum guidelines for its development. If we miss it now (1951), we may not only miss it for a generation, but for keeps. This Advisory Board would perform an annual review of how the licensees of radio and television stations are living up to their responsibilities for public service and education, and how they are performing in line with the promises they made when they applied for their licenses. There is no viewers or listeners lobby in Washington, and the FCC has neither the time, nor authority, to actively seek out, marshall, and crystallize public opinion."

The question of public interest (broadly defined as that which is in the best interest of the public) came up again in the middle of the FCC's hearings on approval of a color system for the nation. During one session of FCC hearings, NBC President John H. McConnell told the FCC:

"If you approve the CBS color system, which does not produce black and white pictures on regular (i.e. not specially equipped) **black and white receivers, broadcasters would be unable to transmit color during the choice** (prime was not the word then) **evening hours because there would be a substantial loss in audience for black and white receivers not equipped with converters for the colorcasts."**

The implication that this would slow

down color acceptance (i.e. no choice time color programming), and disenfranchise the large public sector without special color receivers or converters was clear.

The possibility that the United States Supreme Court would get squarely in the middle of "public interest vs. the FCC" arose in the high court's review of the FCC award of color standards to the CBS field sequential system. In mid-1951 the high court ruled that the FCC was correct in their assumption of the right to set and approve color TV standards. However, the Court *also* said:

"The CBS field sequential color system utilizes old knowledge, and this system has created a focal point of contention by those who declare the mechanical wheel is an antiquated system. It is a fact that existing (black and white) receivers are not constructed in such a way that they can, without considerable adjustments, receive CBS colorcasts, either in color or in black and white. This makes the system incompatible with millions of receivers now in the hands of the public. The wisdom of this (FCC) decision can be contested, as shown by the dissenting vote of two Commissioners.

However, courts should not overrule an administrative decision merely because they disagree with its wisdom."

So the high court found the Commission correct in their assumption of authority to prescribe standards and approve a system that performed according to those standards, but it also found the FCC lacking in wisdom for approving the CBS color system. In a word, the FCC had made a dumb decision, and potentially millions of TV receivers would pay the price.

During this era of handling the future of the nation's television airwaves, perhaps the most searing in-

dictment of the FCC's handling of the public responsibility came during 1955. Senator Warren G. Magnuson, through his Senate Interstate and Foreign Commerce Committee, was right in the middle of another round of investigations of the FCC's handling of the UHF/VHF allocations tangle. An aide in the Senate Committee, former FCC Staff Attorney Harry M. Plotkin, released to the Committee something later dubbed the *Plotkin Memo*. In it, Attorney Plotkin said of the problem:

"The public has a legitimate interest in the way that network affiliations are granted. In the first place, the network (exclusivity agreement) tie is a most valuable asset for all television stations, and is the difference between success and failure for stations.

UHF stations are having great difficulty in securing network (affiliation) service, and unless they are able to secure such service on a fairly extensive scale, successful UHF operation is very difficult. There is a good prospect that a large part of the radio spectrum will go unused.

Television stations and networks tend to cloud the matter of program duplication on two (or more) outlets simultaneously as a very touchy issue. They don't want to talk about the standards that networks initiate to determine where duplication does and does not take place.

Accordingly, networks should be required to publish and file with the Commission the standards they purport to follow in determining what is excessive duplication of service areas, in awarding network affilitations."

Picking up on the Plotkin Memo theme, the Senate Interstate and Foreign Commerce Committee's Majority Counsel, Sidney Davis, tried to run with the ball.

". . .institute a full hearing into the network ties with advertisers, agencies, advertising rates, discounts and multiple ownership, program packages, and other allied problems."

Davis was hoping to get sufficient data to get to the root of the difficulties which UHF stations were having staying on the air and serving their publics. Officially, Davis resigned from his post as Majority Counsel because of "ill health". But everyone in Washington knew that his insistence that all program and network affiliation problems be looked into was heavily opposed by many of the Republican members of the probe group. So, the investigation into program affiliation practices *never did* take place, even after the firey Plotkin Memo had opened the door a crack.

PIONEER'S PIONEERS
a) H.T. HOWARD
b) DAVID BARKER

H. TAYLOR HOWARD

On May 21, 1976 **H. Taylor Howard** did something which many other Americans were doing that same day; he poured a concrete slab behind his garage in San Andreas, California. On July 1st, 1976 Taylor did something which **no other American** was doing that particular day; he transported a 15 foot Mark Products aluminum tube parabolic reflector to his home with the intent of installing a home TVRO system. Only at the time, the four letter phrase 'TVRO' had not yet been coined and Taylor had little idea that what he was doing would one day lead to a billion-dollar-plus electronics industry centered in America.

On September 14, 1976, H. Taylor Howard saw his first satellite TV pictures. The first transmission, from RCA's F2 bird, had a red background with white lettering and the static display read as follows:

"Attention. All Earth Stations."

Henry Taylor Howard has been watching satellite television in his home ever since. The first receiver was a combination of surplus and 'homebrew.' His multi-decade background as an amateur radio operator plus his teaching position at Stanford University guided him as he hand etched a circuit board for the microwave strip lines so his first Hewlett Packard HXTR 6102 'signal amplifier' (later to be called LNA) could be built.

*Howard's home terminal was the first (see **CSD** for October 1984)* and he would continue to be 'first' in the years that would follow. He would become **the first** President of SPACE, **the first** to adapt modern antenna feed technology to parabolic (microwave) antenna

The Satellite Receiver You've Been Waiting For

Introducing the newest, most advanced remote controlled satellite receiver . . . the Regency SR5000.

We started with the latest in satellite receiver technology, using two microprocessors, block down conversion, and infrared remote control. Then, we topped it off by fitting it into a compact, stylish case of true "set-top" dimensions with a large, easy to read LED display. And that's just for starters.

Two Microporcessors and More

Satellite positioning, polarity, and skew can be programmed and selected automatically. All programmed information is stored in the SR5000's permanent, non-volatile memory. What's more, the Regency receiver features a built-in SAW resonator modulator with channel 2 or 3 output, descrambler loop, signal strength meter, and composite or baseband audio and video outputs. Not to mention the remote control . . .

Full Function Remote Control

Every Regency SR5000 comes complete with a full function infrared wireless remote control that's very easy to operate. It lets you select channels (direct access or slew), select satellite positions, raise, lower, or mute the volume, and fine tune the picture. All with only 20 keys.

Block Conversion

The SR5000's advanced design employs a block down conversion system so you'll be sure to have the best possible picture year round (The Regency block system is stable within 2MHz from −30 to +60°C). And it's ideal for selling multiple receiver systems.

The Price That Packs a Punch

Now for the good news. The SR5000, with all the features we've described, lists for $699.95. So your cost will be lower than receivers like the Drake 240, the KLM VIII, or the Luxor 9550. Yet the SR5000 is backed by Regency, a company that's been around since 1947, a company that invented the transistor radio in 1954, a company with an established reputation in consumer electronics. And the company that designed and builds the SR5000 in America.

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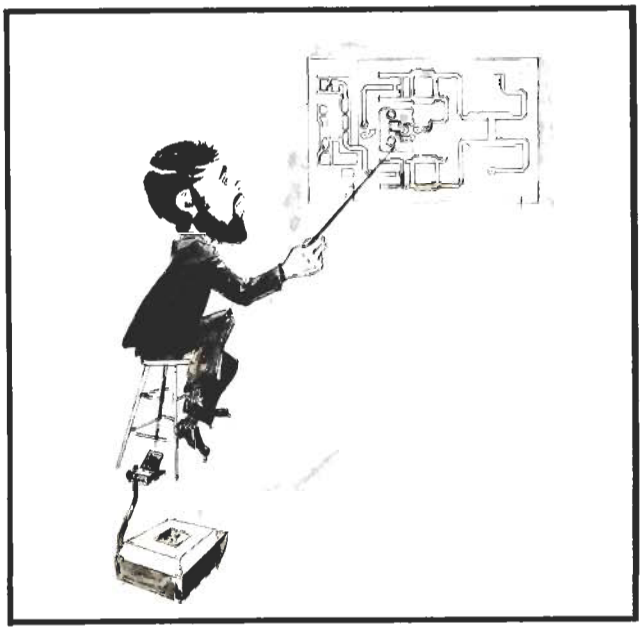


systems, **the first** to mass-market antenna feeds and non-mechanical polarization systems, **the first** to provide professional design consulting for TVRO receiver suppliers and **the first** to . . . the list is virtually endless.

Taylor Howard was not always a willing contributor to this young industry. He wrote recently "On May 8, 1979 a fella named Cooper appeared at (the) ranch and nothing has been the same since. (I was) dragged kicking and screaming from the ivory tower (at Stanford) into the commercial world. I tried to re-enter the academic world after the Oklahoma SPTS show and now the institution has retired me. This leaves me out in the cold, cruel world having a ball . . .".

In the recent election process for the SPACE Board of Directors, H. Taylor Howard received 46 votes from his fellow 'Pioneer Members' (of SPACE). That is noteworthy because the next most popular 'vote getter' had 41 'votes.' It took at least 28 votes to be named to the SPACE board. Taylor is universally respected and admired by virtually the entire industry; a position which he has earned because of his tireless efforts to assist newcomers to the industry with their technical problems.

There is one other 'Howard First' to be reported; Henry Taylor Howard was also the 'first' member of the industry to receive the now annual **'CSD Industry Man Of The Year Award'** (January 1981). As Dick Deutsch of Channel Master said in announcing Taylor to the Industry's Pioneer Hall Of Fame during the September 03 Nashville Birthday Party, "H. Taylor Howard has successfully married academia to the commercial world of TVRO." Taylor conceived his first terminal as an experiment in technology, a challenge. He did not conceive the home TVRO industry but his contributions through the years have breathed life into a static life form that needed that marriage between theory and practice.

DAVID BARKER

David Barker has always been a 'maverick engineer'; a man who keeps largely to himself and his family, doing 'his thing his way.' Barker is the man who created the basic receiver design concept which the industry utilizes today; the 'single conversion image reject mixer system.'

Barker entered the industry at the beginning, attending the first industry trade show held in Oklahoma in mid-1979. Barker came as an attendee and ended up 'on stage' teaching a course in microwave receiver design. Barker came to Oklahoma 'looking for answers.' He was not comfortable with the industry's basic receiver concepts (double or dual conversion receivers, a spin-off of the early CATV satellite receivers) and minced no words in saying so. He engaged in classic theory debates with one H. Paul Shuch, an early TVRO receiver designer who shared the early receiver design honors with Taylor Howard. Shuch was a 'purist' who insisted on following accepted microwave practice. Barker was not so ready to accept anyone's recommendations and he left Oklahoma determined to find a better (as in simpler and cheaper) way to build a TVRO receiver.

By mid-spring of 1980, he had done this. He called his design **'SuperVerter'** and with the mind of an engineer, not a marketing person, he announced and advertised the product in **CSD Magazine** in mid-1980. He also appeared at the industry's San Jose (California) show in July of 1980 where he again took the podium to explain his receiver design.

Barker's work eliminated approximately 35% of the parts required to build a TVRO receiver. In addition to parts savings, his design also reduced the alignment or 'factory tweeking' time by about 50%. As he said in San Jose "If you want to buy a $10,000 test set to align a $100 satellite receiver, that's fine; but there is another way. If you want a receiver which has only six (alignment) adjustments, two of which you 'screw down tight' and two of which you 'open up wide' and then you have satellite TV pictures to complete your final tweeking, there is another way . . .". Notice he did not presume to say ". . . a **better** way . . ."; merely ". . . **another** way . . .".

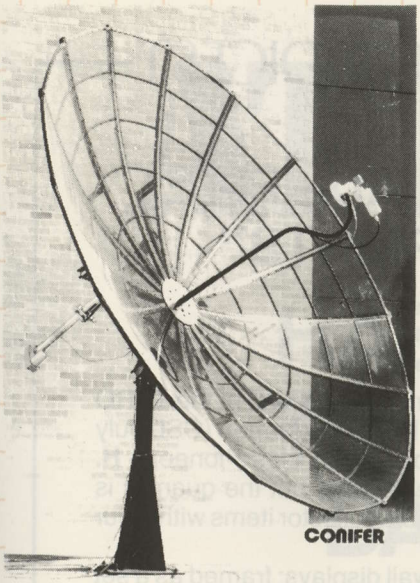
His 'another way' in short order became a **'better way'** and eventually for all but a handful of receiver manufacturers **'the ONLY way.'** The first to jump on the Barker-design-bandwagon was a firm called **KLM;** a manufacturer of amateur radio equipment and antennas. KLM had representatives in the audience and they saw much merit in what Barker was describing. Within weeks KLM would be completing design work, with Barker's assistance, on what would become the fabled 'Sky Eye I' TVRO receiver; the first relatively high volume (300 per month initially) satellite video receiver.

The volume production of TVRO receivers was one of those 'water-shed' events in the development of the TVRO industry. **Without volume,** there was not the product quantity required to support large dealer development. **Without volume,** there was no place for the 'distributor' since the strength of the distributor was his ability to stock equipment in sizeable quantities to serve the dealer's one or two receivers at-a-time needs. All of this pin-wheeled off of the developmental work started by David Barker after he left the first SPTS event and went to work in his workshop.

Supplier **Ed Grotsky** of Arunta recalls the early David Barker

SPECIAL five-print Litho offer for Pioneers on page 44, here.

PIONEERS/ text continues on page 46



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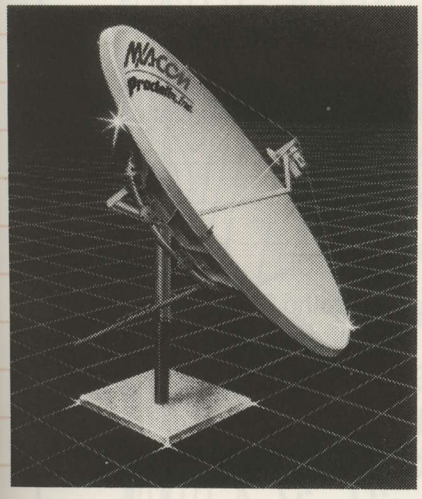

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These "Pioneer's Pioneer" Litho Prints make excellent retail store or office wall displays; framed as a set (you provide the frames, we provide the prints!) you have an attractive 'conversation piece' which will help you point out to visitors some of the early exploratory work done in our industry that led to the present billion-dollar-per-year industry. There is no charge for these prints; they are available without charge nor obligation through the generosity of **Boman Industries** and CSD Magazine.

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All you have to do to receive your complete set of five (eight will be issued in all; five have been issued to date) is to complete the questions below and fill in your own name and shipping address. Send no money; all charges are 'pre-paid'!

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_____

_____

_____

2) Up to the enactment of this legislation (October 11, 1984), **how would you characterize** your own fall sales?

_____ Better than '83 _____ About same as '83 _____ Poorer than '83

_____ Better than expected _____ About what expected _____ Worse than expected

3) What area of a TVRO system **do you feel** could be improved, by product design and innovation?

_____

_____

_____

YOUR NAME/address

_____ **Send me** at no charge ALL FIVE of the TVRO Industry "Pioneer's Pioneer" Litho Prints issued to date.

OR

_____ **I ALREADY have** Coleman, Taggart and Brown; send me the two latest prints of Howard and Barker **ONLY.**

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Send form to:

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NOTE: This offer expires December 15, 1984.

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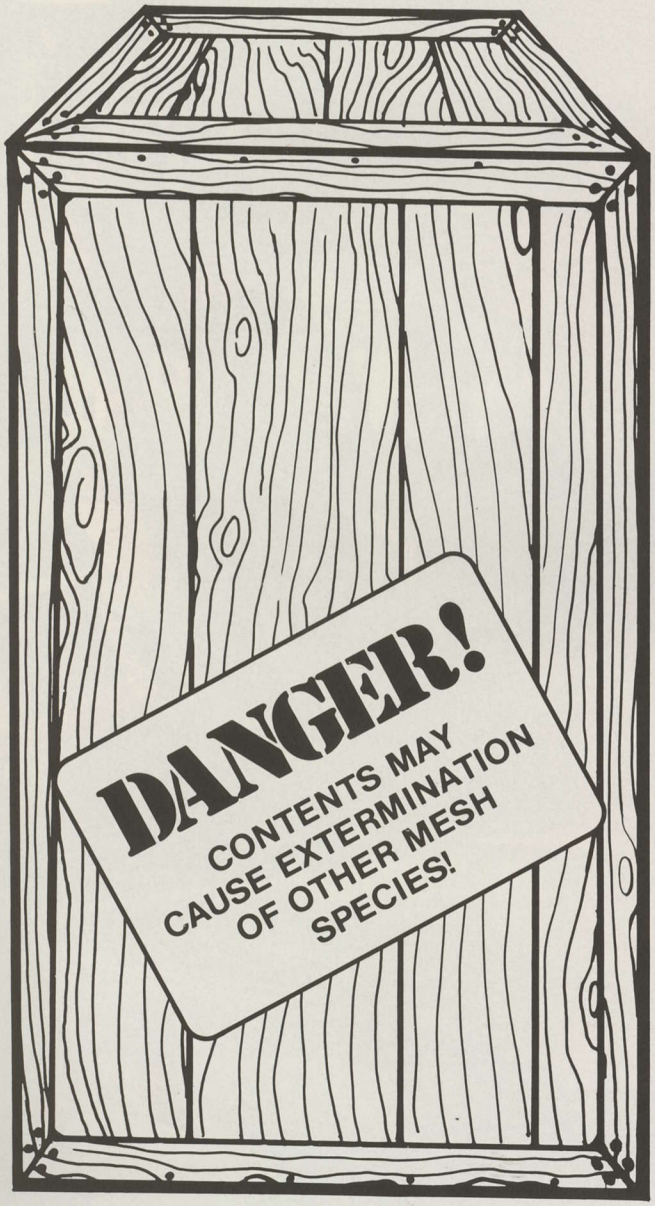

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HAI

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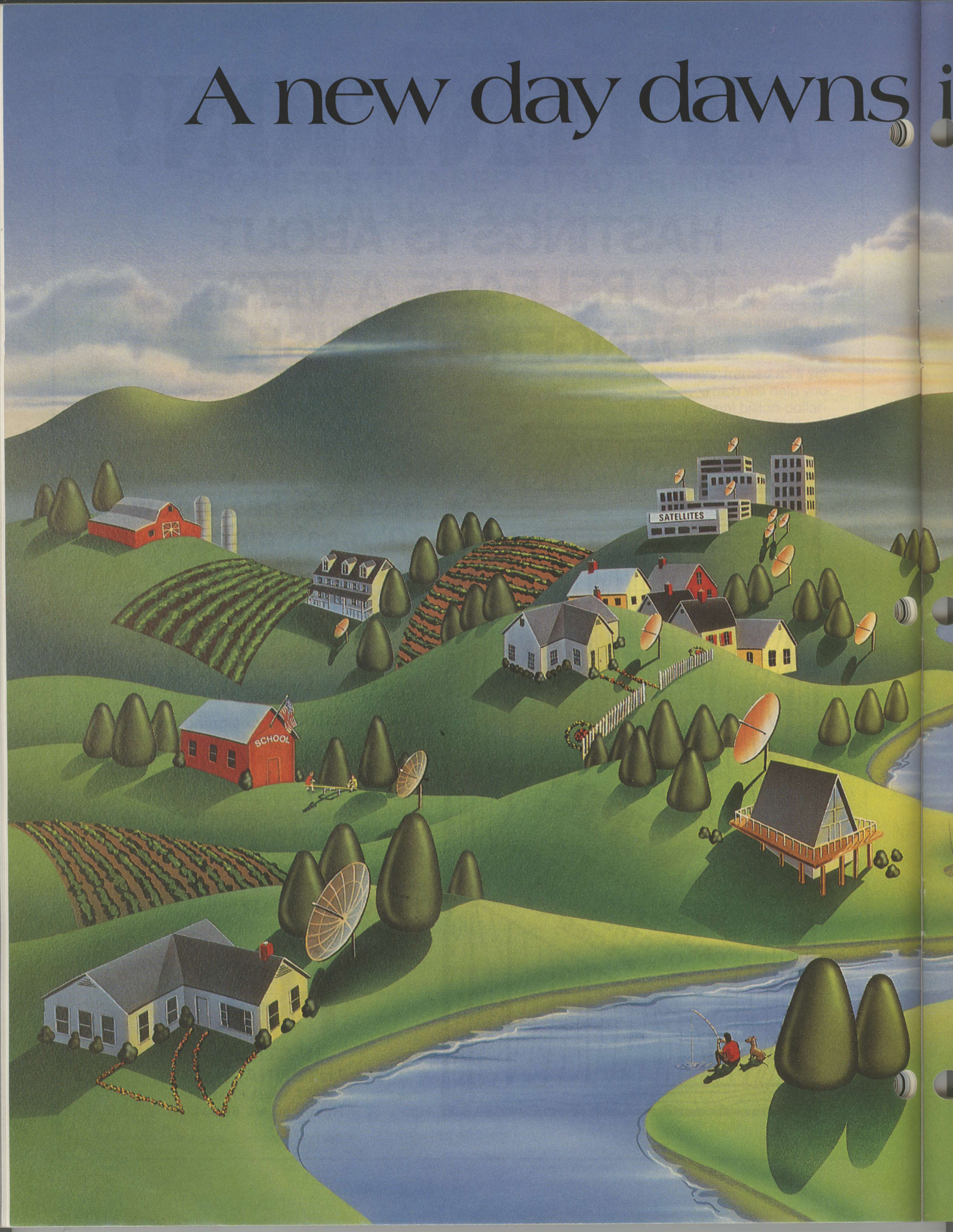
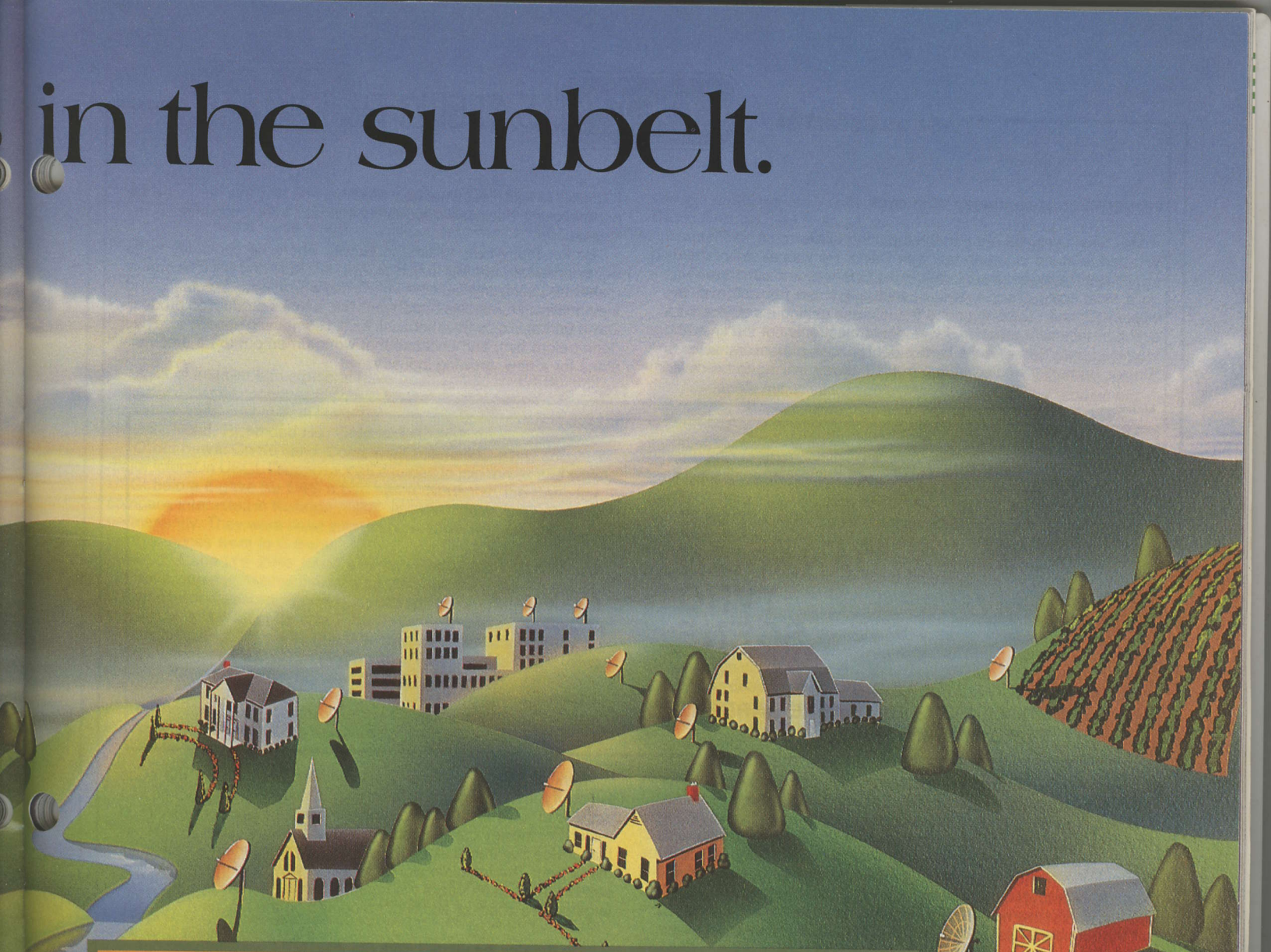
A new day dawns i



in the sunbelt.



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PIONEERS/ text continues from page 40

work. "David brought me into the industry. In his home, in Phoenix, you had to stand in line to talk with David. He was already famous (1979/1980) even before he created the 'SuperVerter,' although it was on a local scale. People would eventually come from all over the western United States to spend ten minutes getting his advice on a circuit or technical problem. I was not in electronics at the time and stumbled onto Barker quite by accident. It took me several visits to 'Doctor Barker,' standing in line in his hallway waiting to be called ("Next!") to figure out what he was doing and why this had to be the most exciting business opportunity I would ever encounter in my lifetime."

Barker today lives fulltime in Hawaii where he continues to do developmental work. His major 'client' is still KLM and while he openly makes his talents available to virtually any who ask, his allegiance is to the firm which turned his proto-types into a mass production product. David Barker is a pioneer because he did something nobody else had done before him, and because that work turned out to be a cornerstone for a new, growing industry.

THE CANADIAN TVRO SCENE

by MARK LEWIS, 2 BRAEMORE GARDENS TORONTO, ONTARIO M6G 2C8

Searching for the "perfect" dish is something **Ed Berkhof** does for a living. Ed is chief designer at York Spinning Mills in Richmond Hill, Ontario. His plant is located about 20 miles due north of Toronto's City Hall. York is a relative newcomer to the TVRO industry (but who isn't?). The company has been around for many years and has been primarily involved in manufacturing metal products on its giant lathes. Much of its output could be described as "custom work." On the day I visited Ed, his crew was finishing work on some fuel tanks. A variety of different products (not related to TVROs) were found throughout the plant.

Berkhof himself is no newcomer to TVROs. He had sold and installed a lot of systems before joining York Spinning Mills about 2 years ago.

He set out to design a complete TVRO including reflector, feed assembly, an accurate polar mount and a good roof mount. Recently he has designed lifting devices to place the dish on the mount with a minimum of strain and most important, with a minimum of labor.

Berkhof's philosophy is interesting. He not only demands performance from his products, but he also is concerned about the installer's "bottom line." For example, he noted that labor costs eat up installers' profits. Large reflectors have often meant lots of hands for mounting, and lots of hands translates into lots of mouths to feed. Along with the lift system, Berkhof has refined the mount and reflectors so that reflectors can be bolted to the mounts with a minimum of hands and labor. He has also strategically placed bolts where the installer's hands can reach.

His other main concern aside from gain and performance is terrestrial interference. In that category, he's an expert. His plant is located in a heavy microwave route literally at the foot of a large CATV microwave tower. A TELEPOST data microwave signal which blankets the Toronto area can ruin almost everyone's day including the installer and the consumer. In metro Toronto, TI saturation is significant, and York Spinning Mills is a good test site. So Berkhof's test range might be said to approximate some of the worst case scenarios for Terrestrial Interference.

Ed knows that eight foot dishes are becoming the de-facto standard in urban areas. In this part of Canada with low look-angles, and recent launches of closely-spaced G2/F2; W5 and Spacenet, there are lots of challenges for designers who want to see good side-lobe performance from their dishes. Berkhof has lots of sidelobe challenges.

Berkhof himself designs the templates which guide the huge lathes. If you have never seen a metal spinning lathe, it may come as a surprise to you that the template looks more like a block of steel. If you remember the key-cutting machine in the hardware store, you'll recall that device that tracks along the sample key while the machine does the cutting. The template works the same way, and the mechanical part of the machine tracks the template while the machine spins the large square sheet of aluminum mounted on the machine.

On the day we visited York Spinning Mills, we witnessed one of the trials and tribulations of the TVRO designer. On one lathe was a mis-shaped 8′ metal hulk which **almost** resembled a dish; but not quite. Certain design "innovations" did not transfer from the drawing board to the machines and mechanical stresses in the spinning process caused the metal to distort. A couple of hundred dollars worth of high-grade aluminum stock was wiped out. Needless to say, Ed's technicians were preparing changes to this dish design.

The 8′ dish being manufactured by York Spinning Mills has a f/D ratio of .35. The focal length is 29.75 inches and performs very well with the closely-spaced W5 and Spacenet birds. No sidelobe problems are noted with G1 & F3R, despite their close spacing at this latitude. Berkhof was in the process of evaluating some design changes to the outer edges of the dish. His goal is to further minimize TI when the microwave source lies to the side of the dish.

The York 10′ has a f/D ratio of .365. Ed rates efficiency of the 10 footer at 75% with a prime focus feed and Chaparral. He had not yet tested the new "Twister" on his dish.

At the present time 2 spinning machines are devoted to dish production. York's other machines produce a diversity of spun metal products, all the way from "promotional-mini-dishes" for displays, to gas tanks. They are in the TVRO business for the "long haul" and regardless of market fluctuations, which affect the TVRO industry from time to time, they are in a position to "crank up" production without major capital expansion.

Berkhof estimated his fall '84 production at **400-500 units per month,** much of it for export. He is also getting overseas enquiries. While the overseas market is still very small, the shipping costs for single piece spun aluminum dishes aren't too crippling. Nevertheless, York Spinning Mills isn't banking on a lot of exports to Europe yet.

The quality I found most intriguing in Berkhof is his emphasis on the installer's problems. With dishes mounted on roofs, a lot of instal-

lers use a pole too small for Canadian winds, or 20-30 feet of pipe to reach the roof line, then the most common problem is the pole is **out,** just a tiny bit, and it leads to lots of sidelobe problems and tracking nightmares.

York Spinning Mills roof mounts are hefty. Berkhof has also moved away from 3" O.D. poles because he's seen too many failures when poles and concrete couldn't support dish and ice and wind. He has seen so many bad installations that he's thinking about writing the ultimate "how to" book!

A lot of installer's frustrations have been solved by Ed Berkhof. Let's hope that he continues his quest for that elusive perfect 8 footer. He can be contacted at York Metal Spinning and Specialties Ltd., 234 Newkirk Road, Richmond Hill, Ontario, L4C 3G7.

Other news: On Ku band, Comsat will use Anik C. It has bought a major interst in USCI. I suppose they decided to join forces and save USCI before it gave Ku DBS a bad name. Northstar, the Canadian company interested in Ku band "DBS" seems to be on hold, perhaps permanently. They were dealt another blow when the new Canadian video services went to C Band.

Also, Canada's 2-Ku band pay services signed a truce and promptly retreated. Rather than merge, they split the country in two (to fit their east and west spot beams). As of September 1, **Superchannel** serves Canada west of Ontario, **First Choice** serves eastern Canada including Ontario. They also shut down the up-link in Ontario. Now, all uplinking for pay-TV is done in Edmonton. They will also cease using some of the costly Ku band transponders.

Look for Radio Quebec, the French Language Educational service on the eastern spot beam of Anik C. GHZ Engineering of Montreal to supply equipment for that network.

The question of a "Disney-like" channel for children and youth in Canada still in doubt. Also a number of "would-be" quasi-pay services for Canada are in doubt. An Italian language service is having a hard time finding CATV industry affiliates for its service. The multilingual service serving British Columbia is in receivership and now programs exclusively in the Chinese language. Their satellite use is in doubt. Several new services missed the filing date.

Two services which did make it, despite overwhelming odds, are TSN **(The Sports Network)** and **Muchmusic.** They are on TRs 1 and 5 of Anik D. Muchmusic uses stereo subcarriers; often distorted, we're not sure if they are standard stereo subcarriers. The problem with distortion may lie in the audio board at the TV studio.

Random Notes

C-Space is still trying to get off the ground. **Chris Budd** vowed to take another shot at organizing a Canadian-based industry association. He was flown into Niagara Falls STTI. Canadian Industry Pioneer **David Brough** tried to stir up more interest in an association. Budd characterized the problems in starting a trade group during a telephone conversation:

"Too many Canadian companies see each other as competitors and won't work together. But they should!"

While SPACE may fight some of the larger battles of significance to U.S. TVRO industry and consumers, there **are** different issues facing Canadian industry and consumers. To name a few; trend by municipalities to enact zoning by-laws outlawing TVROs; **CSA** (Canadian Standards Association) approvals, or lack thereof for equipment; lack of coordinated "type approval" of U.S. FCC and Canadian D.O.C.; a litany of customs and excise and regulatory problems including bureaucrats who don't know or don't care what a TVRO can do.

Even if SPACE secures access at modest cost to encoded signals **for U.S. TVRO viewers,** what will be the effect for Canadian viewers if customs duties and foreign exchange problems persist?

I have worked with trade organizations in Canada for many years. Cooperation and funding are the key words. It costs a lot of money to fly across the country; even more, to drive across the country. Unfortunately an effective trade organization needs a lot of funding, every month of every year, and a long term commitment from its members. Miracles don't happen overnight. When lobbying government, politicians and bureaucrats, you chip away at prejudice and injustice. Throwing ten or twenty bucks into a hat won't give C-Space a chance. If Canadian dealers and manufacturers want to insure that they will be around next year, they had better invest in some **life insurance.** C-Space may be the answer. Without C-Space the potential for harm is very great.

Last, **Francis Fox is gone.** The Progressive Conservative party swept across Canada in a massive victory on the day after (U.S.) Labor Day. Winning more than 210 of 285 seats in Parliament, the Conservatives decimated the ruling Liberal party. Defeated in his own "safe" Quebec was former Communications Minister Francis Fox. He appeared to be as popular with his constituents as he has been with the TVRO industry. His return to political life could be years off.

Don't expect fast policy reversals in Canada as a result of the election, but **do expect** some deregulation of the broadcast industry. The cable industry will lobby the new government to allow them to be more competitive with TVRO and SMATV. The emphasis will be "more competitive" rather than "outlaw TVROs."

We welcome your comments, and your product news. If you are introducing a new product into the Canadian market, we would be pleased to review samples. You can reach us at 2 Braemore Gardens, Toronto, Ontario, M6G 2C8.

SCPC ACTIVITY REPORTS

GORIZONT SCPC

by Marshall Foiles VP5M

There is a rich 'mother lode' of FM type SCPC signals and services available on the **Russian Gorizont** satellite which flies nominally at 14 west. These services originate (i.e. are uplinked) from various locations in Russia, Cuba and one suspects (but without a foundation in the languages involved, cannot verify) in various other countries as well. Some of these transmissions are the traditional telephone circuits, others are teletype or fax (facsimile), while still others are the traditional-to-North America radio network feeds for various Russian regional and national radio service channels.

On your typically North American receiver dial position of 4 you will find the Russian SCPC services crammed together with an incredible concern for maximum use of the available frequency spectrum. In fact, one of the first and most obvious observations is that Russian SCPC is about two to three times as 'closely packed' as typical American or Canadian SCPC. In the 14 west Gorizont transmission system, you often find as many as 130 separate carriers, each with some distinct form of modulation present, crammed essentially end to end.

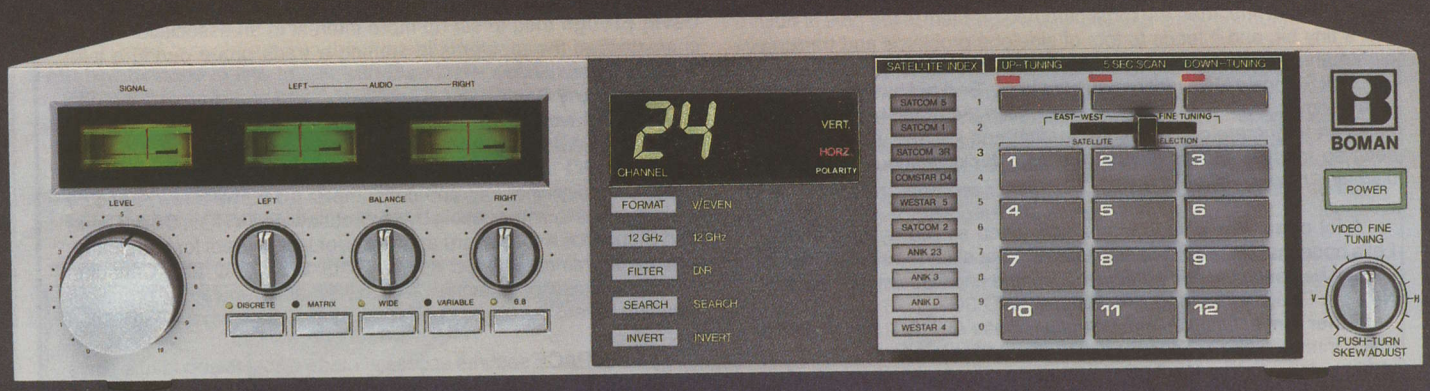
A **Hero SCPC-66** receiver, as has previously been outlined in this column, connected to your basic TVRO system is all of the equipment you need to at least get your feet wet. The SCPC-66 or an equivalent package allows you to tune through the Russian transponder in tiny chunks and separate out the various narrow band audio or data services. Printing of Russian teletype or fax would require an appendage set of equipment capable of taking the audio 'tones' coming from the speaker jack and turning them into screen or paper 'prints.'

A table listing here lists the more powerful of the routine service channels which you should be able to find without difficulty if you have a 13 foot antenna within the footprint of Gorizont. These observations:

1) Gorizont SCPC carriers are typically modulated into what appears to be a 5-7 kHz bandwidth; telephone carriers aside

SCPC/ continues on page 50

At Last... Five In One.



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3) Programmable Dish Drive

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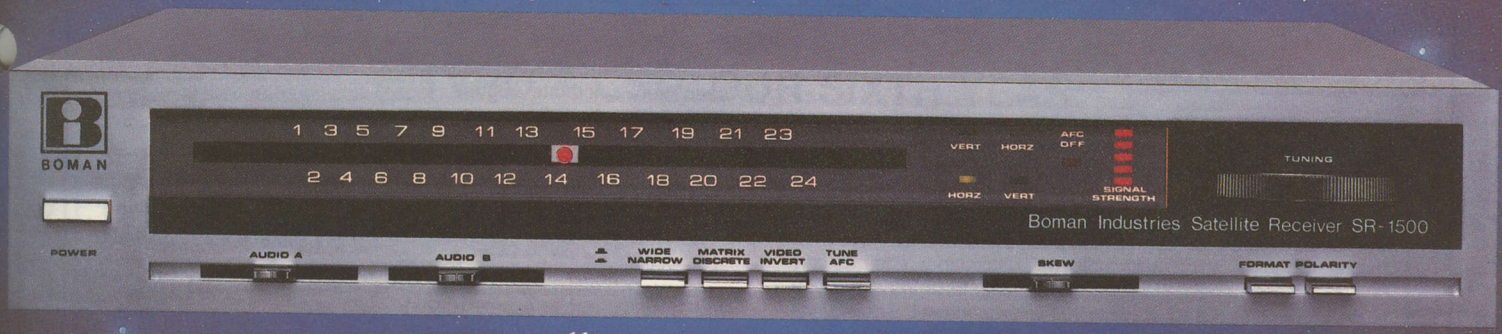

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In spite of its modest price, the SR-1500 delivers video performance that can challenge any receiver on the market. And, it delivers *STEREO* sound for less than most monaural units.

This exceptional value is augmented by a list of features that makes a powerful statement about marketability.

- *Built-in Stereo Processor*
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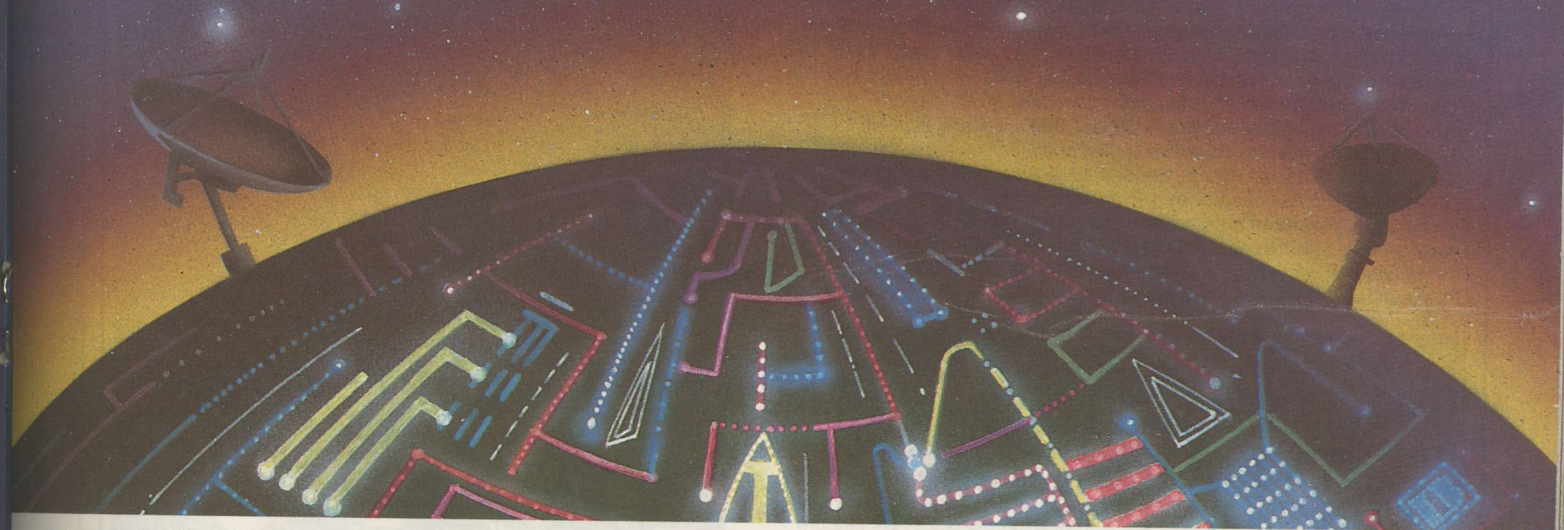
- *Vert/Horz Push-Button*
- *Skew Slide Control*
- *Format Push-Button*
- *L.E.D. Signal Strength Indicators*
- *AFC Push-Button*
- *Video Invert Push-Button*
- *Slide-Rule Tuning*
- *TV CH 3-4 Modulator*
- *LNA/Down Converter Voltage-Retained*

And, the attractive slender design of the SR-1500 will make it a welcome addition to any family entertainment center.

Boman Industries

25th Anniversary



CALIFORNIA, Uni-Sat Communications, Los Angeles, (213) 923-7814; **GEORGIA,** Kelgo International, Atlanta, (800) 241-8189; **INDIANA,** C.V.S. Systems, Inc., (317) 662-0037; **LOUISIANA,** Satellite Earth Station, Covington, (800) 654-9144; Satellite Earth Stations, Mamou, (800) 762-2110; **MONTANA,** Paramount Satellite, Missoula, (406) 728-0647; **MISSISSIPPI,** Sunbelt Satellite, Oxford, (601) 236-5517; **MISSOURI,** Star-Com Distributing, Jefferson City, (314) 893-6666; **NEVADA,** Hasting Antenna Co., Hastings, (402) 463-3598; **NEW YORK,** Sat. View Dist., Bridgewater, (315) 822-6532; Satellite Video Services, Inc., Palenville, (518) 678-9581; **OHIO,** Satellite Sales, Inc., Worthington, (800) 521-6136 (in OH), (800) 345-5527; **OKLAHOMA,** Star-Com Distributing, Oklahoma City, (405) 672-9617; **OREGON,** I.S.S., Portland, (503) 297-3713; **PENNSYLVANIA,** Kelgo International, Pittsburgh, (800) 321-0600; **TENNESSEE,** Lewis Electronics, Humboldt, (901) 784-2191; **TEXAS,** Sunbelt Satellite, Arlington, (817) 861-5881; Satellite Earth Station, Austin, (800) 252-3457; Star Com, Big Spring, (800) 351-1426; Nampa Satellite, Houston, (800) 421-8300; **UTAH,** Video Link, Salt Lake City, (800) 762-8876; **WISCONSIN,** Delta Satellite Corp, Cedarburg, (414) 375-1000; **CANADA: BRITISH COLUMBIA,** Terrco Corp, Vancouver, (604) 877-1391; **ONTARIO,** Banvil Ltd., (416) 878-8181; Sigmacom Consumer Products, Whitby, (416) 666-1661.

SCPC/ continued from page 47

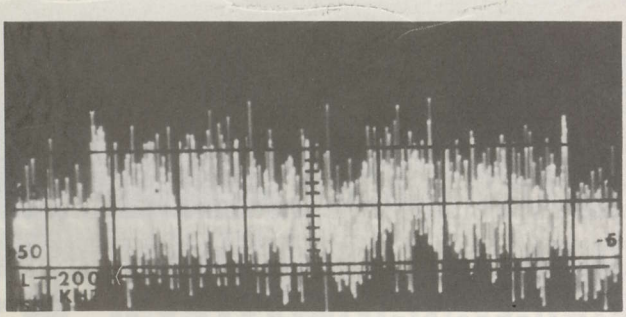
(typically narrower than this);

2) 'Blocks' of channels seem dedicated to Cuban use and the Spanish language stands out from the crisp Russian dramatically;
3) Women talk more than men, on both Cuban and Russian SCPC channels. Cuban women often are heard talking to what one supposes are Cuban men while Russian women usually are conversing with Russian women (make of that what you will). There is little suggestion that in either case the conversations are 'Honey, I'll be home late for dinner.'
4) Russian radio networks spend lots of hours sending out music followed by seemingly endless hours of talk. Their radio is not 'formatted' to move swiftly nor with accustomed American tight production.
5) (East) German radio is heard quite often and these segments often also include network 'cues' with announcers advising stations what to anticipate next, and when. This leads one to assume the radio networking done on behalf of the Germans is designed to fill 'network time blocks' and that local 'affiliates' in turn fill part of the broadcast period 'locally.'
6) Cuban radio networks come and go and they are tightly formatted ala American radio. It is not unusual to hear American music on the Cuban networks, in original artist English; there is a propensity for US country and western music.
7) Use of Russian/Cuban/(East) German frequency blocks varies as a function of time of day; the uses seem to parallel the normal 'working hours' in each country or region and Russians do sleep just as Americans do, only ten hours earlier than we do!
8) Cuban uplink signals vary widely in signal level with many of their uplink signals not reaching saturation. Russian and (East) German uplink signals are all very even in level, indicating good control of uplinking powers.
9) We have not been able to get any 'printing' out of ANY of the Russian teletype even though we have a printer which is capable of printing the Russian alphabet. For RTTY buffs, the mark and space signals do not seem to be 'standard' by American or world agreements and when we have that sorted out, we'll let you know.

The Russian Gorizont satellite contains in microcosm virtually everything you will find in western domestic (and Intelsat) birds. At press time the 14 west bird is wandering in a figure 8 pattern which takes it slightly south of the exact equatorial location around 9 AM eastern and **well north** of the equator at around 9 PM eastern. The best reception period for a dish that cannot track north and south of the equator would therefore be around 7 AM and 1 PM eastern. On a 20 foot dish that does NOT track, the signals are certainly usable from approximately 3 AM eastern to 4 PM eastern.

Russian **television** is currently found on **1 –** (minus) or the **Moskva** service, 1 + (between 1 and 2 on US dial), and 6. The long-in-use transponder 9(+) service was **replaced** September 1st with the new transponder 1(+) channel and presently the transponder 9 channel is in use for testing of digital audio and data services; no video has been seen there since late August.

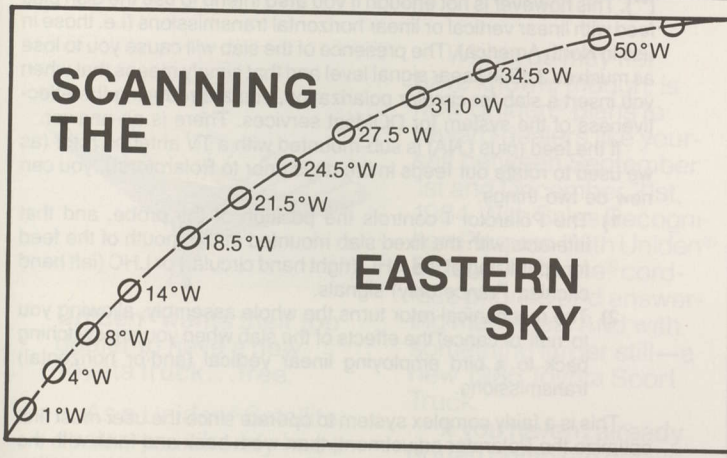
And now the listings:

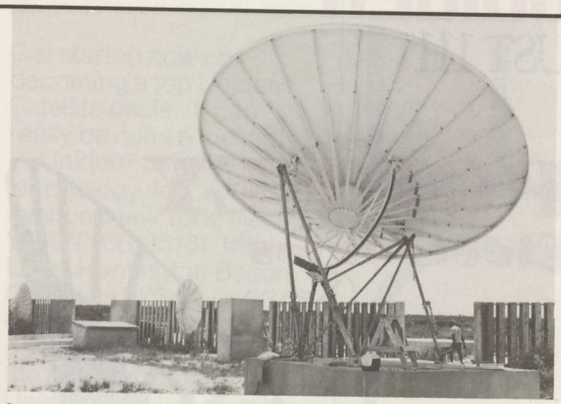


SPECTRUM Analyzer display of the transponder 4 (US dial) **SCPC channels that rise above the noise on Gorizont. Approximately 10% of all of the narrow band audio channels are 'scrambled' as either upper or lower sideband format signals.**

Satellite	Transponder	Service/description	SCPC-66 Tuning Voltage
Gorizont (14 West)	4	Telephone	9.4
		FAX	10.2
		FAX	10.4
		FAX	11.0
			11.2
			12.5
			12.7
		FAX	13.0
		FAX	13.3
		News Network	13.7
		FAX	13.8
		Telephone	14.2
			14.6
		Radio Teletype	14.7
		Tone	14.8
			15.0
		Spanish/English (Cuba) Music Network	15.1
			15.6
		Radio Teletype	15.7
		Telephone	16.0
		Tone	16.4
			16.7
		FAX	16.9
		Radio Teletype	17.0
		Telephone	17.3
		Telephone	17.5
		Radio Teletype	17.6
		Telephone	17.8
		FAX	18.0
		Lower Sideband SCPC	18.2
		Telephone	18.6
		Scrambled Lower Sideband	18.8
		Telephone	18.9
		Telephone	19.2
			19.5
			19.7
		FAX	20.0
		Telephone	20.2
		Music Radio Network (USSR)	20.4
		Tone	22.0
			22.6
		FAX	23.0
		Tone	23.1
			24.1
		Telephone	24.6
			25.2
		FAX	26.0
			26.2
		FAX	26.8
			27.2
		Radio Teletype	27.7
		Radio Teletype	27.9
		Tone	28.0
		Radio Teletype	28.8
		Telephone	29.3
		Tone	29.7
		Radio Teletype	30.4
		Tone	30.9
		Radio Teletype	31.1
		Radio Teletype	31.5
		FAX	31.8
		Scrambled upper sideband	32.2
		Scrambled upper sideband	32.5

TVRO & CSD/ OUR SIXTH YEAR!





by MARSHALL FOILES, CSD LAB, PROVO

Selling What's There

As the TVRO world becomes better known in the non-technical community, and the consumer masses become conversant with the 'normalized' concept of routinely sticking a 4 to 16 foot dish up on the property to bring in from 10 to 110 TV channels, there will be a growing interest on the part of those people who have specialized interests. They may be individuals with a cultural heritage that ties them to some European country, or they may represent a college or university where real-world live-linkups to a South American or African or European country's national media is attractive. The dealer who understands **all** of the various services available, and who further understands what type of equipment is required to produce those services for a paying client will be a step ahead of the run of the mill dealership that knows and understands only one type of simplistic home installation for DOMsat reception.

CONTINENTAL 10 meter installed in Santiago, Chile this past August opened the door to Chilean market for Oregon firm. Julian Jauregui Leguas, **Technical Director for the network, was introduced to Continental while attending trade show in Las Vegas.**

Scanning The Eastern Sky is designed to keep you advised and alert to **new satellite selling opportunities.** We will routinely survey the various satellites from 53 west to 0 west to report to you on the services to be found there, and the equipment required to receive these transmissions. Our own system, located at the **CSD Lab** on Providenciales in the Turks and Caicos Islands, presently consists of an ADM 20 foot antenna dedicated solely to the eastern sky. Additional antennas will be installed to support this program over the coming months. For the past several months we have been building a 'data base' of information, collected by first-hand observation of the satellite activity in the 'eastern sky.' A full 'data dump' all at one time would consume virtually the entire contents of this issue of **CSD,** so we'll do it a bit at a time and update those birds where major changes take place with each publication of this new segment in **CSD.** To acquaint you with the basic services available, we'll look at a few satellites in some depth with each such report so that within six months or so we will have covered all of the satellites visible in North America between 53 west and 0 west.

The now quite commonplace video services, found from such countries as Portugal, Brazil, Argentina, Chile, France and so on have been covered in some detail on an on-going basis with news reports in our 'Transponder Watch' segment of **CSD,** as well as with the occasional feature article or correspondence from a distant viewer. We will not ignore the video, of course, since this remains a video-driven industry. However, we will also not ignore the non-video services since they offer some surprising alternatives to the video customer base you are accustomed to dealing with as a TVRO seller.

This technical note to set the stage for what follows.

Virtually all antenna mounts and drives sold in the North American TVRO marketplace have been designed to function with our domestic (US and Canadian) satellite belt. This simply means that most such mounts and most such drives are not properly designed to provide horizon **to** horizon **coverage,** giving the user adequate or repeatable dish-moving-ability into the eastern sky. **CSD** dealt with this topic in our **June** (pages 11 to 22) and **August** (pages 38 to 51) issues. In particular, dealers who do not yet understand the complexities of a polar mount for true horizon to horizon (i.e. full eastern sky capable) use should carefully read the August installment **(*).**

The CSD Lab System

As noted, the **CSD Lab** receiving system for the eastern sky is a

'dedicated' 20 foot ADM. It is equipped with a Polarotor I polarization system and it has been equipped with a 'teflon slab' which serves to convert the feed proper into a circular polarization optimized system **(**).** This however is not enough if you **also** intend to use the dish plus feed with linear vertical or linear horizontal transmissions (i.e. those in use in North America). The presence of the slab will cause you to lose as much as 3 dB in linear signal level and that simply means that when you insert a slab for circular polarization, you are reducing the effectiveness of the system for DOMsat services. There is an answer.

If the feed (plus LNA) is sub-mounted with a TV antenna rotor (as we used to rotate our feeds in the days prior to Polarotors!), you can now do two things:

1) The Polarotor I controls the position of the probe, and that interacts with the fixed slab mounted in the mouth of the feed for optimizing of the RHC (right hand circular) or LHC (left hand circular; France only) signals.
2) The mechanical rotor turns the whole assembly, allowing you to 'null' or cancel the effects of the slab when you are switching back to a bird employing linear vertical (and/or horizontal) transmissions.

This is a fairly complex system to operate since the user must first optimize the Polarotor adjustment, then work back and forth with the mechanical rotation system and the Polarotor until the best reception is found. A receiver with a sensitive signal level metering system (or an outboard signal level metering system, such as described in **CSD** for June 1984) is mandatory. The alternative is to physically put in and take out the slab when you switch from international satellites (53 west on east) to domestic satellites. A third alternative is to simply dedicate a dish to the eastern sky uses and forget about using it beyond 53 west or so (to the west) at all. There is one other consideration that speaks to the latter possibility (other than being able to SELL a pair of dishes to your customers!); if you dedicate a dish for eastern sky-only reception, you can get by with a standard drive and mount since the dish will stay in a manageable span of Clarke Orbit arc and not cross over the 'center line' that would bring you into the sky to the south and west at all. The only consideration here is that you 'reverse' all of what you normally do when mounting such a dish since the dish will look 'left' rather than 'right' in normal use (i.e. move the drive to the eastern side if you normally place it on the western side of the polar mount).

The feed system disposed of, the Lab System uses a good grade of LNA to feed through a 20 foot section of RG-214/U cable and into a block downconverter for the AVCOM 66T receiver. The block converted signal, in the 270-770 MHz region, is transported through a length of 8213 (**not** RG-213) cable, a relatively low loss, larger cable for **75 ohm** systems.

A two-way signal splitter sends the IF signal in two directions:

1) To the COM-66T receiver, which is equipped with switchable full and half transponder IF boards to allow use with both full (25-28 MHz) and half (12-16 MHz) bandwidth signals;
2) To a second two-way splitter which feeds the IF signal range into a Texscan/(Jerrold) VSM-2 spectrum analyzer, and
3) To a Hero SCPC-66 audio receiver which allows fully independent tuning of the full 24 transponders to search for single channel per carrier audio transmissions which are sent separate from the normal video or video plus sub-carrier audio transmissions.

The video (and audio) from the 66T are in turn connected to a JVC VM-14PSN multistandard monitor which provides automatic selection of the American NTSC video format, the European PAL or the European/Asian SECAM color formats. The Brazilian PAL format signals and the Argentinian PAL format signals can**not** be resolved in their glorious color on this particular monitor; a special monitor designed for sale in these two countries is required for the trio of Brazilian video services or the single Argentina service.

And that completes the basic system, less any confusion as might be added by a detailed explanation of th SSB (single sideband) or RTTY (radio teletype) peripheral equipment **(***)** also in the system.

This is a research system, perhaps not likely to be duplicated in a private installation. However, systems as elaborate or more so do exist now in 'private hands' including several recently installed for major Universities (such as Columbia) where 'world-class humanitarian research' is underway using the latest, available, satellite 'tools.'

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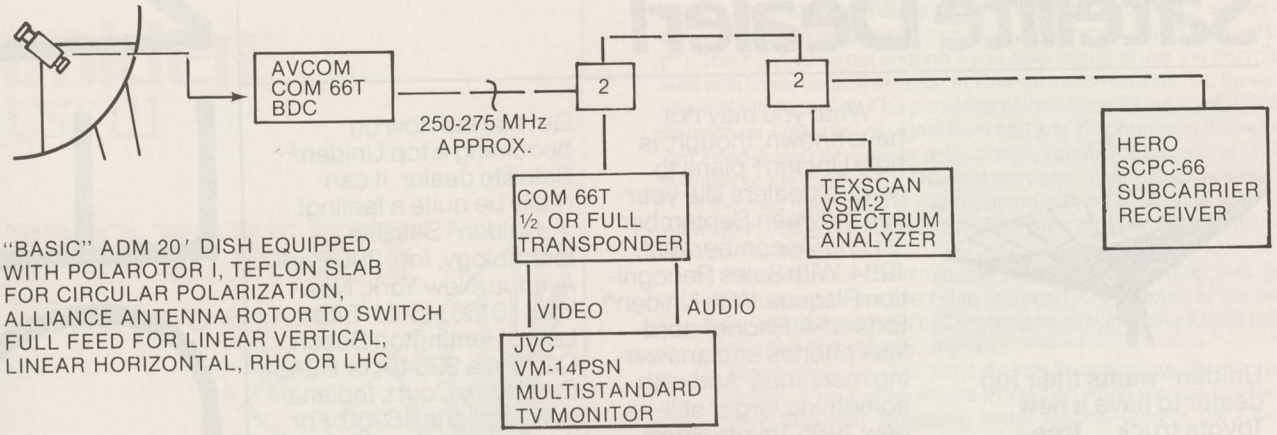


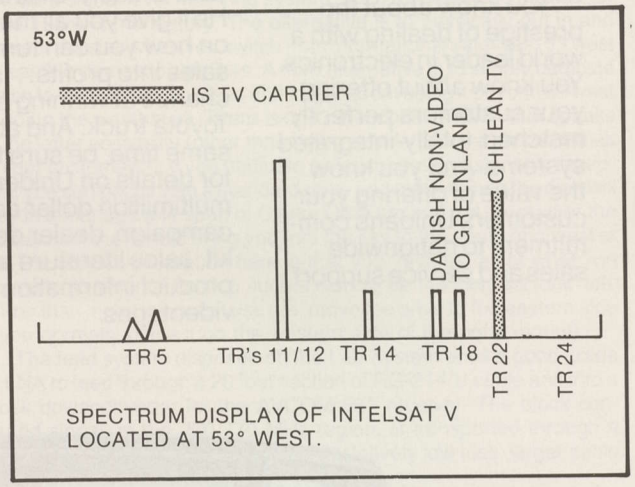
"BASIC" ADM 20' DISH EQUIPPED WITH POLAROTOR I, TEFLON SLAB FOR CIRCULAR POLARIZATION, ALLIANCE ANTENNA ROTOR TO SWITCH FULL FEED FOR LINEAR VERTICAL, LINEAR HORIZONTAL, RHC OR LHC

BASIC EASTERN SKY SYSTEM (RTTY AND SCPC/SSB EQUIPMENT NOT SHOWN) **PROVIDES VIDEO AND AUDIO RECEPTION FOR VIRTUALLY ANY FORMAT NOW IN USE.**

53 West

The first satellite you run into as you begin moving east is the latest Intelsat (V family) bird, now positioned at 53 west. This bird was originally thought to be a replacement for an older Intelsat IV bird which has served as a 'domestic lease' for Mexico at the same location for more than two years. The older Intelsat bird has been moved to 50 west (we'll look at it next) and this new class bird is now in limited use for a couple of 'domestic leases' for Chile and Denmark.

By Intelsat standards, the 53 west bird is lightly loaded. A spectrum analysis of its normal activity is shown here. The spectrum analyzer, connected to the full BDC output range to display any signals that might be located in the 3.7 to 4.2 range (at the BDC IF), is a very handy tool for the eastern sky watcher or installer. A scanning receiver is handy when there are plenty of video signals present. Intelsat at 53



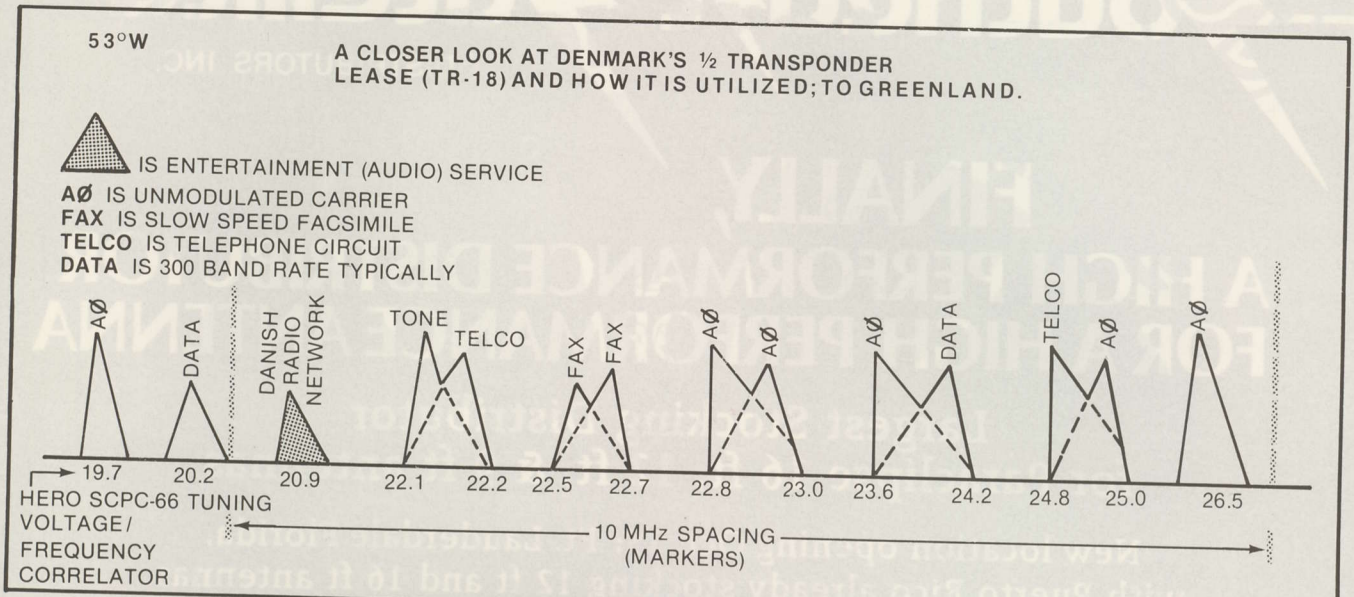
SPECTRUM DISPLAY OF INTELSAT V LOCATED AT 53° WEST.

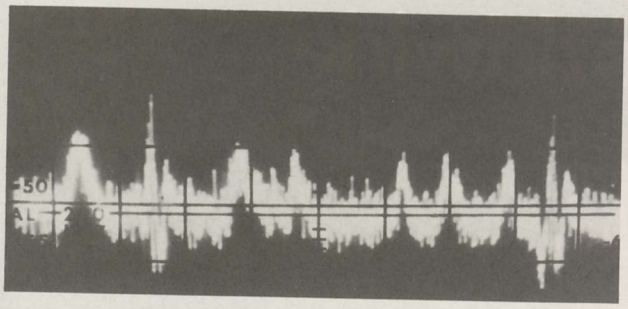
*/ Copies of **CSD** for June and August 1984 are available as long as the supply lasts. Send $5 per issue desired with a note stating the issue desired to **CSD Library, P.O. Box 100858, Fort Lauderdale, Fl. 33310.**

/ Technical details of equipping a feed are available from **Chaparral Communications and are also found in **CSD Anthology;** available from CSD for $75 postage paid for all 1,000 pages of the first two years of publication. Address orders to **CSD Anthology, P.O. Box 100858, Ft. Lauderdale, Fl. 33310.**

***/ A new book describing the specialized receiving techniques required for SCPC RTTY and other unusuallly formatted satellite signals is announced and advertised on page **86** of this issue of **CSD.**

CHILEAN NATIONAL service is using a Global footprint on TR22; NTSC color at about 19 dBw. National news nightly at 8 PM eastern and virtually no American programs.





west at best has a single **regular** video transponder (Chile's national service on TR22; a Global Beam pattern in the 19 dBw region).

Another interesting service found on 53 west is a half transponder lease service operated by **Denmark.** There is no video here and unless you are into listening to people speak Danish between Denmark and Greenland, there is no obvious interest here; save one channel of audio.

A special spectrum display shows the break-down of this half-transponder service (TR18). This is a Global Beam situation so anyplace that has visual access to the 53 west location should have reception. Dealing with the narrow-band format of the SCPC channels, antennas in the 16 foot class should be adequate (but marginal). Your attention is drawn to the service found on the left hand side of the display; a special feed of the **Danish national radio network** for Greenland. This one operates around 16 hours per day, features a largely 'American' selection of pop music, as well as current news, weather and time from Denmark. Someplace out there you know or will one day meet somebody who would **pay you money** to have a live feed from Denmark of their national radio service, via satellite! Now you know **where** it is and **how** to produce it virtually anyplace in the USA.

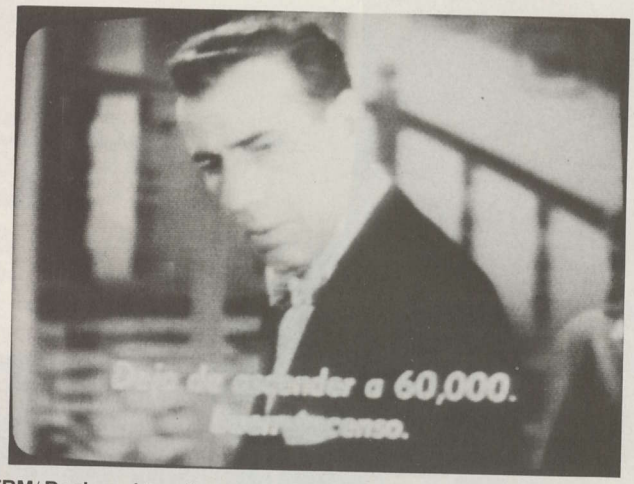
The future of Intelsat V at 53 west is bright, if not abundantly clear at the present time. This late-series Intelsat bird was positioned at 53 west to give Intelsat a 'lead' on connecting Europe and North America together at 4 (and 12) GHz. The bird has impressive capabilities, hardly reflected in the limited present-day use reported here. We'll be watching the progress at 53 west and keep you advised.

50 West

It was in mid-summer that Intelsat V became operational at 53 west, and the (then existing) Intelsat IV bird at the same location was slowly moved to a slightly further-east station; 50 west. This IV series bird has been the home of a number of Mexican television (and audio) services for several years. It will continue this operation until the launch in 1985 of the first Mexican domestic satellite (scheduled for operation early in the summer of 1985 from a location just west of the Canadian portion of the North American DOMsat belt).

With the back pedaling to 50 west, service improved for many areas. This old-style IV series satellite is already past retirement age but it continues to provide excellent service nonetheless. From 53 west, it was overshooting a good segment of the middle and eastern Caribbean while being spotbeamed (boresighted) on the Mexican Yucatan peninsula. From 50 west, there is considerably improved service in the previously missed Caribbean regions and **at least two** of the four video channels operated for Mexican domestic service **should interest English speaking audiences** there.

Because of the leased-to-Mexico status of the 50 west bird, there is not a mixture of services here; only those of interest to or in use by Mexican interests are found here. They are as follows:



TRM/ Designed to advance the culture and education of the rural Mexican population manages to slip in many US movies each week as 'language lessons' for Mexicans not exposed to English on a routine basis. It works both ways; you can learn Spanish in the process; at least written Spanish!

1) **TR1/ XEW-TV,** 'canal dos,' Mexico City. This is perhaps the most professional, well run, and impressive Spanish Language television station in the Americas if indeed not in the world. The

EASTERN SKY/ continues on page 58

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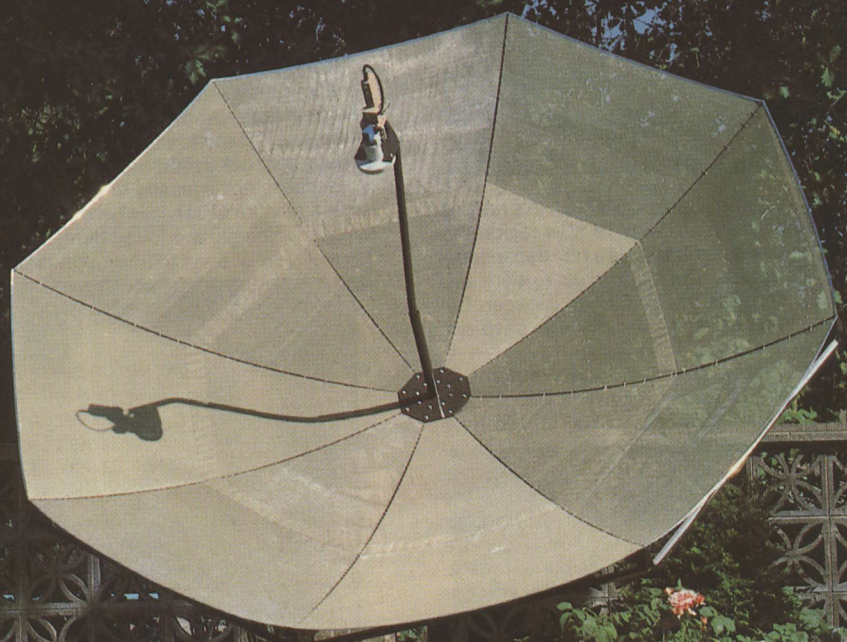

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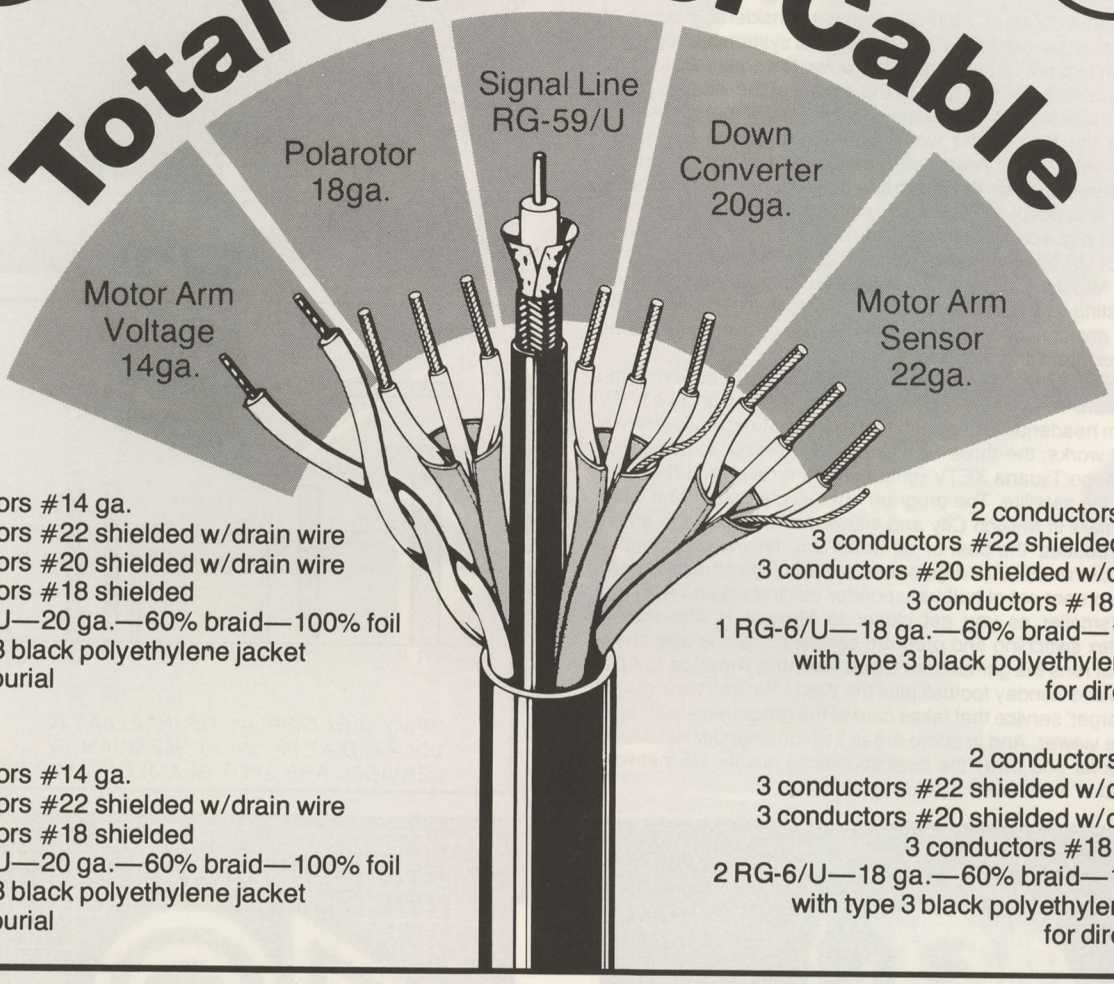

TYPE 1
2 conductors #14 ga.
3 conductors #22 shielded w/drain wire
3 conductors #20 shielded w/drain wire
3 conductors #18 shielded
1 RG-59/U—20 ga.—60% braid—100% foil
with type 3 black polyethylene jacket
for direct burial

TYPE 2
2 conductors #14 ga.
3 conductors #22 shielded w/drain wire
3 conductors #18 shielded
2 RG-59/U—20 ga.—60% braid—100% foil
with type 3 black polyethylene jacket
for direct burial

TYPE 3
2 conductors #12 ga.
3 conductors #22 shielded w/drain
3 conductors #20 shielded w/drain wire
3 conductors #18 shielded
1 RG-6/U—18 ga.—60% braid—100% foil
with type 3 black polyethylene jacket
for direct burial

TYPE 4
2 conductors #12 ga.
3 conductors #22 shielded w/drain wire
3 conductors #20 shielded w/drain wire
3 conductors #18 shielded
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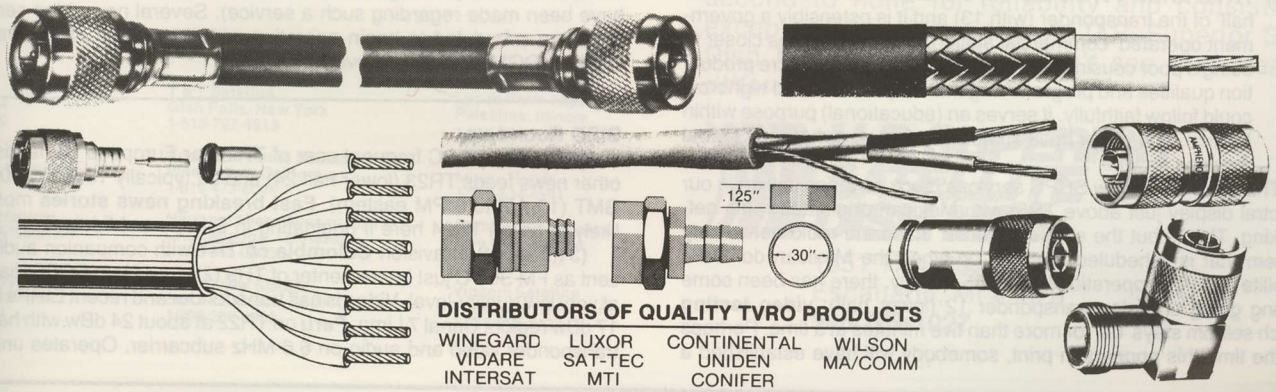

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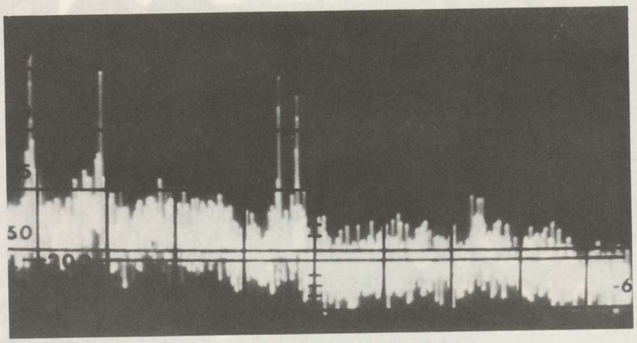
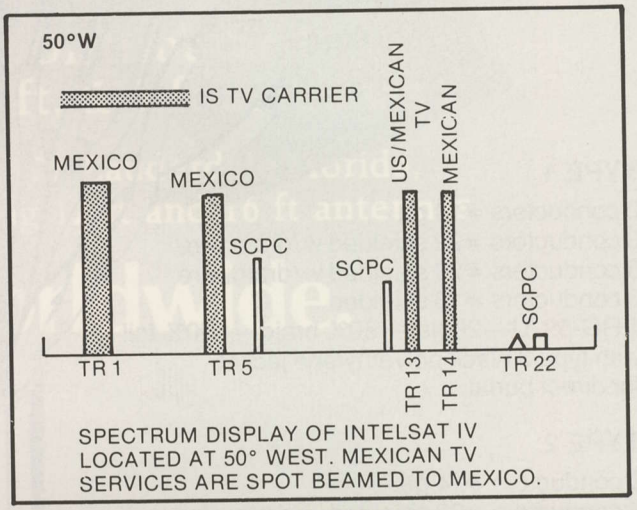
EASTERN SKY/ continued from page 55

'family' that operates XEW also owns a considerable chunk of SIN, Galavision and other 'US' broadcast system properties. If you don't speak Spanish, just turn down the sound and fire up the big screen TV and take in the quality of the video productions; especially in the variety shows. XEW personnel are among the best in the world with stage lighting and video special effects. No American production even comes close.

2) **TR5/ Television de la Republica de Mexico.** This channel is similar in concept to 'PBS' in the states except they stray some from strictly educational fare. In particular, the vintage (and classic) US Movies shown typically at 10 PM (eastern time; 9 PM in Mexico City) which are run with Spanish sub-titles are interesting if for no other reason than they are not edited down to fill pre-conceived television time periods, nor are they chopped up with commercial breaks.

3) **TR13/** This is a mixture of U.S. (San Diego) area formatted television, relayed in half transponder format, to cable TV system headends in communities such as Mexico City. Here is how it works; the three San Diego US network stations plus San Diego/Tijuana XETV (channel 6) are received off-air and fed to the satellite. The program **'mix'** is created for the cable customers in Mexico City and elsewhere in Mexico. In effect, this produces 'the best of' all three U.S. networks and just a touch of the XETV (independent) service. The attraction here, with a proper set of half transponder electronics and a 20 foot dish (smaller as you get closer to Mexico) is that without complex switching and program selection, here is **one channel** that runs the gamut from **Good Morning America** to **After Mash** and Sunday football plus the World Series. It is a 'plug in and forget' service that takes care of the programming choices for the viewer. And in some areas this transponder reaches, it will be far and away the best (technical) quality 'US network' reception available.





SPECTRUM DISPLAY OF INTELSAT IV LOCATED AT 50° WEST. MEXICAN TV SERVICES ARE SPOT BEAMED TO MEXICO.

4) **TR14/ XHDF-TV,** Mexico City's channel 13. This is the 'other half' of the transponder (with 13) and it is ostensibly a government operated 'commercial station.' In fact, it comes closer to being a poor cousin to PBS in the states with mediocre production qualities and programming that only a dedicated highbrow could follow faithfully. It serves an (educational) purpose within Mexico, and might have limited interest elsewhere in Central America as well.

There are also a few SCPC services (such as those shown in our spectral display just above TR5) with Mexican originated radio networking. This is but the start of a rather elaborate radio networking system that is scheduled to crank up when the Mexican domestic satellite goes into operation in mid '85. Finally, there has been some testing going on using transponder 12 (lower half); **video testing** which seldom stays 'up' for more than five minutes at a time. Perhaps by the time this appears in print, somebody will have established a new service here (although at the moment no formal announcements have been made regarding such a service). Several new video services are scheduled to begin operation with the launch of the first Mexican DOMsat bird, however.

BIRD Round-up

(34.5 West) NBC frequent user of TR24 for Europe to US feeds; other news feeds TR23 (lower half 24) and 22 typically 1500 to 2000 GMT (10 AM to 3 PM eastern). **Fast breaking news stories** most likely to be on TR24 here if originating in Europe or Middle East.

(31.0 West) Inravision **Colombia** on TR1 with companion audio sent as FM SCPC just below center of TR9 (22.5 on Hero SCPC dial) at very low quality-level. Video is half transponder and recent EIRPs in 17 dBw region. Canal 7 Lima, **Peru** on TR22 at about 24 dBw with half transponder video and audio on 6.6 MHz subcarrier. Operates until

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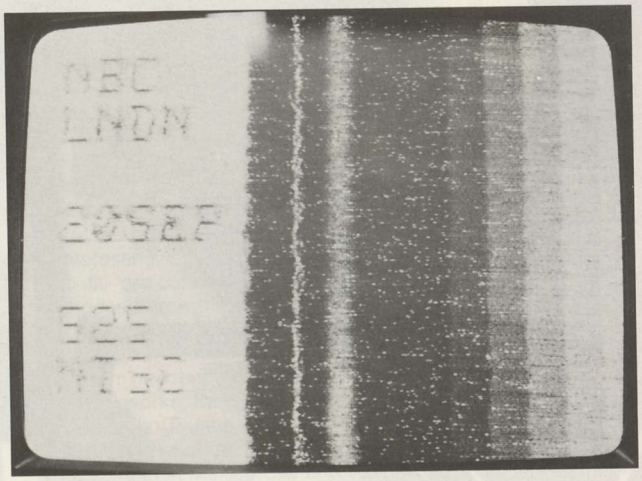
past midnight eastern time, NTSC. ATC **Argentine** Televisora Color on TR24 at about 24 dBw in non-standard PAL (color) format with audio on 6.4 MHz subcarrier. Operates until past midnight eastern



COLOR IN Argentina is not color in the USA. Semi-custom PAL format is used here and in Brazil.

RTP/7 is Peru's national television service channel. Some U.S. programming, plenty of "Llama Care' features.

NBC London feeds cross Atlanta typically on TR24, 34.5 west with plenty of activity around 3PM eastern time.

RUSSIAN SERVICE has moved to TRs 1 and 6 from prior TR9. Rock Music 'Videos' recently scheduled Thursdays TR1 or 6 around 11 AM eastern for two hours plus. Not standard Russian TV fare!

time.

(27.5 West) Venezolana de Television, **Caracas** now operating TR5 here (moved from 31 west) with NTSC color, subcarrier 6.2 MHz, at about 30 dBw; operates 18 hours plus per day. No other video here.

(24.5 West) Occasional video for **CNN** and others TR24 typically in 17-19 dBw region half transponder format, subcarrier tuneable audio.

(21.5 West) Brazilian TV (Bandeirantes TR1 and Rede Globo TR5) at usable levels (22-23 dBw, lower than previously reported) with 5.8 MHz subcarrier audio in Brazilian PAL format 18 hours plus per day. Bird signal levels vary ±3 dB indicating bird attitude control 'problems.' Rede Globo 'feed two' on TR11 in 17 dBw region recently.

(18.5 West) Occasional video for US and European broadcasters on TR24, typically 1500-2000 GMT (10 AM to 3 PM eastern) in 17-19 dBw region with subcarrier tuneable audio.

(14 West) Gorizont has gone through recent changes, moving video **off of** (US) TR9 in favor of TRs 1 and 6. Signal levels show bird currently well off equatorial position between 1900 and 0400 GMT (1500 to midnight eastern) requiring tracking of elevation system. Peak signal levels also down from previous operations six months and more ago indicating reduced EIRPs or recent change in operating bird (EIRP/dBw drops to 3 dB measured).

SPECIAL Report . . .

(34.5 West/Intelsat V) Two interesting 'new services,' recently activated by the USA and France, are found on Intelsat at 34.5 west. Both have at least 'marginal ability' to attract potential buyers/users of

TVROs and one of the two new services may turn out to be a major factor in selling new 20/25 foot terminal systems over a wide region of South America, Africa, Europe, the middle east and even some segments of the USA.

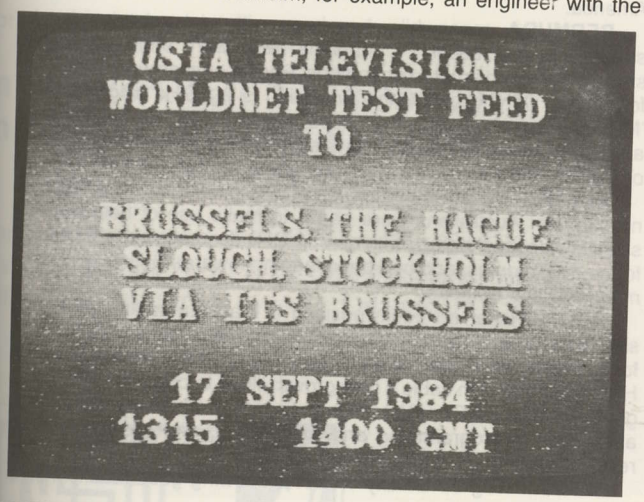
1) The **French TDF FR3** national network feeds a 'DEF' (Direct Electronic Feed) news service weekdays (weekends not certain) at 1400 GMT (9 AM eastern) for typically 20 minutes time. This is found on TR23 (US receiver designation), Global Beam pattern, with audio on a nominally standard (tuneable) audio sub-carrier. EIRP appears to be in the 19 dBw region.
2) The new American USIA (United States Information Agency) '**WORLDNET**' feed routinely (but not on a published schedule) on TR24. audio is a standard, tuneable, sub-carrier.

This service was inaugurated on the 17th of September with a special hook-up that took the USIA teleconference to Europe on Intelsat V (TR24) where it was taken down and cross-patched to the 12 GHz ECS-1 for re-distribution in European centers. On line where American consular and embassy personnel in Brussels, The Hague, Slough (United Kingdom) and Stockholm. A quartet of personnel associated with the USIA 'Worldnet' program was located at the Patrick Henry Building in Washington (DC) while embassy and consulate counterparts located throughout Europe had two-way **audio connection** back to the DC studios.

The concept behind the Worldnet is potentially of considerable interest to sellers of TVRO hardware outside of the US. Worldnet will place US political and economic leaders in direct contact with world journalists. The program calls for journalists spread throughout the world (well, the 'free world' since one assumes Russia may not be willing to participate) to be able to go to their local U.S. Embassy where they will sit in a studio and have direct audio contact with the US leader (such as President Reagan). With between four and six such journalists in as many countries spread throughout the globe, the 'satellite press conference'' will be an unusual opportunity for journalists around the world to directly question US leaders; virtually 'privately,' in a way that is not possible when fast breaking events make it impossible for such journalists to travel to Washington to meet with the same leaders.

While no more than six jounalists are likely to directly participate in each Worldnet feed, as interviewers or questioners, the USIA expects that dozens, perhaps hundreds of journalists may be 'observing' at American Embassy locations all around the globe. This will be encouraged so that there is maximum 'exposure' for the 'US position' worldwide. It is an interesting project and after the September 17th roll-out, it is now ready for routine use.

Worldwide, it is the hope of the USIA that the 'Worldnet Conferences' will in fact be picked up by local (as in national) television services for use in local (as in national) television broadcasts. The commercial side of this project has been designed for just that eventuality and in the September 17th test much of the test-time was taken up with reports from the European 'field officers' on the quality of the video and audio. In Stockholm, for example, an engineer with the



Swedish PTT graded the video as 'broadcast quality' but rated the audio as 'just above telephone quality.' Further concerned questioning narrowed down the problem; audio from the Slough uplink was not deemed 'of sufficient quality' by the Swedish PTT but the others in the circuit passed with his blessing.

And so the latest advance in 'world communication and understanding,' the USIA's ITS Worldnet system was launched.

A 20 foot dish properly equipped with RHC and an appropriate electronics package (half transponder was used on September 17th) would not provide broadcast quality reception for TV rebroadcast (the EIRP was in the 20 dBw region). But, it would provide very adequate reception for print journalists to 'follow' the event and to be a 'silent participant' in the news conference at the actual 'event' rather than being forced to accept newswire reports. And that identifies one potential market, in a significant segment of the world, for the new 'service.'

TRANSPONDER WATCH

RECENT REPORTS OF ACTIVITY ON DOMESTIC / INTERNATIONAL SATELLITES

Send your reports to CSD Transponder Watch, P.O. Box 100858, Ft. Lauderdale, FL 33310. For late news, call (305) 771-0505.

APPROVAL by Congress of HR 4103 and S66 establishes foundation for future industry growth by removing industry fears that existing and future TVRO terminals will run afoul of court interpretations of section 605. New section, **705,** establishes guidelines for private, 'home' TVRO reception which will undoubtedly be fine tuned into rules and regulations at FCC shortly.

INDIANA TV dealers want TVRO installers to be state-licensed. They are talking about a $40 annual fee plus a written exam which retailers/ installers of TVRO systems would have to pass before being authorized to operate in the state.

EUTELSAT has gone on record as **not** being in favor of deregulation of satellite communications in Europe. At issue is whether privately owned and operated satellite systems (such as RCA, Westar and Hughes operate for North America) should be allowed, or, should only state-run (i.e. government) systems be allowed. Quote: "(I) am not in favor of deregulation for international public services because the public does not benefit from the deregulation and competition . . .".

NASA wants its Space Shuttle Astronauts to exercise routinely. The problem is the shower. After exercising, the Astronaut has built up a sweat. In the near zero-gravity of the Shuttle, the sweat doesn't 'roll', it stays put and inside of clothing or a suit, it becomes a jelly like substance up to 1/4 inch thick. Collapsible tub-type showers developed are expensive; a shower takes 45 minutes because they have to vacuum up the water afterwards and the shower system developed to date costs NASA upwards of $4,000,000 to operate if a 7 member crew takes one shower each per day!

NBC's Ku band plans are running slightly behind. Contractor Harris expects to have all but handful of network affiliates on-line by end of January and NBC will spend at least 90 days honing system operations before pulling C band service on F1R in favor of four channel Ku band-only service.

STTI show coming up November 18-20 in Dallas (call STTI at 405/396-2574) will feature three 'Dealer Certification' courses including the same two held in Nashville plus one new one.

USCI (pioneer 12 GHz interim DBS operator) folding into STC operation with some effort. USCI ran out of funds and possibly potential users earlier this year after apparently installing no more than 12,000 home terminals. STV is COMSAT affiliate which planned its own 12 GHz DBS service sometime in 1985 or 1986. Chances are USCI operation, controlled by STC, will be only 'interim service' up there until STC launches their own birds on 1986 or so.

DOMINION Video Satellites has decided to purchase a pair of 12 GHz birds from Hughes with mid-1987 delivery. The two birds will be located at 119 west (one for eastern USA, one for western) and will offer 8 TV channels to be used exclusively for 'religious and family' telecasting. The new birds will use 230 watt TWTA final amplifiers and rooftop antennas in the 1.5 to 2 foot region will be more than adequate for the 54 dBw footprints.

INTELSAT caused controversy recently by proposing that nations which allow any firm other than Intelsat (or their national partners) to provide international 'satellite communications' might be dropped from Intelsat roster. Threat is that if anyone is going to compete with Intelsat, that will be end of Intelsat service for offending countries.

CANADA has a 12 GHz bird for sale; a 16 transponder 15 watt per channel bird (C1) which Canada now says it does not need. The satellite is built and ready to launch. It even has launch time reserved on February 12th. Price is negotiable.

JAPAN'S C. ITOH (known to us as DX), Mitsui and America's Hughes have joined in an agreement to get Japan into the C band bird business. The concept is that Hughes will supply technology (and probably satellites) to a Japanese consortium which would operate satellites for both national and international purposes. System could be operating by late 1986 and it might be used for Korean plans to outlink 1988 Olympic coverage.

FCC has approved more 'trans-border' applications, primarily in Atlantic Ocean and Caribbean. Examples: HBO and WOR approved for delivery to Bermuda, Canada, Dominican Republic, Costa Rica and additional points throughout Caribbean plus Central and South America.

BERMUDA, meanwhile, has been without local television for several months. Local TV channels (two) were shut down when striking workers disrupted operations. Radio services were also off air for weeks. Only local TV now operating is 2.1 GHz single channel 'MDS' service previously authorized, delivering combination of CNN and ESPN. Local TVRO sales have skyrocketed as a result with plenty of Conifer and Paraclipse antennas going to island nation.

AUSTRALIA has settled on use of British MAC television system; no surprise. Australians were eager to make use of best possible satellite video technology with new 12 GHz domestic birds scheduled for next 12 months, and had been leaning towards British system for many obvious reasons.

HBO has taken an 'equity position' in Black Entertainment Television (BET), presently trading transponder SPACE on Galaxy 1 (TR17) for a 'share'. BET has not done particularly well in marketplace but HBO feels that with cable's new growth likely to come in urban (read ghetto) markets, BET will become an important marketing factor. HBO assistance in programming and marketing is likely to follow. BET recently went to 24 hours per day.

WTBS testing on Galaxy 1, TR18, showing good results. Fears

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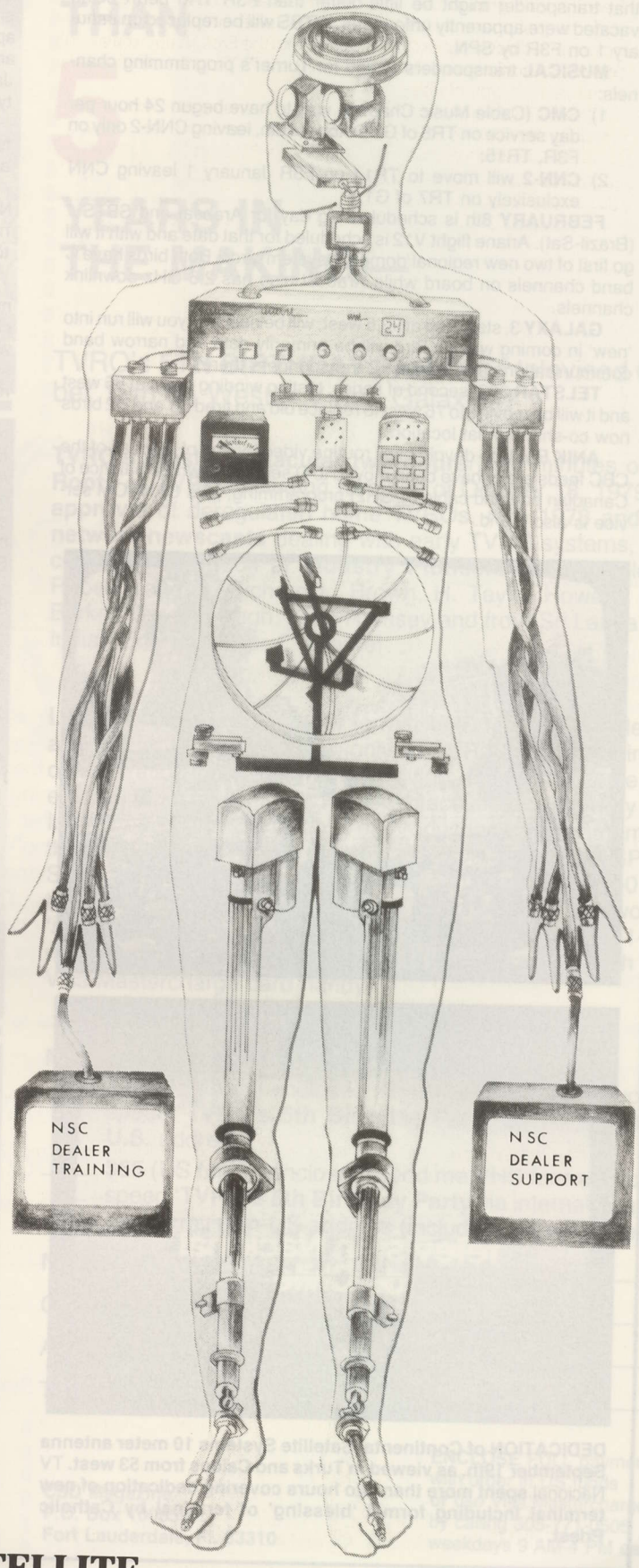

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that transponder might be little-better than F3R TR6 berth being vacated were apparently unfounded. WTBS will be replaced on January 1 on F3R by SPN.

MUSICAL transponders ahead for Turner's programming channels:

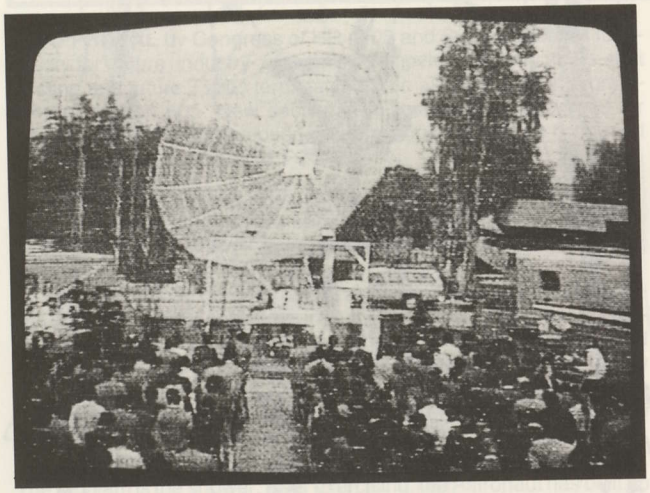
1) **CMC** (Cable Music Channel) was to have begun 24 hour per day service on TR8 of G1 October 26th, leaving CNN-2 only on F3R, TR15;
2) **CNN-2** will move to TR14 on F3R January 1 leaving CNN exclusively on TR7 of G1.

FEBRUARY 8th is scheduled big day for Arabsat and SBTS-1 (Brazil-Sat). Ariane flight V12 is scheduled for that date and with it will go first of two new regional/domestic system birds. Both birds have C band channels on board while Arabsat also has 2.6 GHz downlink channels.

GALAXY 3, stationed at 93.5 west, will be next bird you will run into 'new' in coming weeks. Bird will be primarily data and narrow band communications (MCI owns 12 transponders there).

TELSTAR 302, second of series, testing winding down at 66 west and it will be moving to 76 west to replace old and tired D1 and D2 birds now co-sharing that location.

ANIK B will be devoid of all routine video by end of year; all of the CBC feeds are or have been moved to D series bird where balance of Canadian pay and cable (4 GHz) programming, plus CANCOM service is also found.



DEDICATION of Continental Satellite Systems 10 meter antenna September 19th, as viewed in Turks and Caicos from 53 west. TV Nacional **spent more than two hours covering dedication of new terminal including formal 'blessing' of terminal by Catholic Priest.**

COMSAT has gone to Japan for as many as 50,000 'low cost, small, Ku band terminals' to be used for data and narrow band applications. COMSAT plans to supply Federal Express with network and equipment for their 'Zap Mail' satellite system in partnership with Japanese supplier Mitsubishi. Early 1985 is set for delivery of prototype terminal with full order delivery spread over ten years.

FRANCE has demonstrated link to US using Telecom 1 satellite for video-conferencing. The test system bypassed any use of Intelsat and is sure to bring Intelsat forces down on French organization.

GTE SPACENET Two bird scheduled for launch by Ariane on November 9th; bird will be stationed at 69 west and provide video plus narrow band services ultimately. Eastern edge of orbit belt, dedicated to North America, continues to expand further out over Atlantic.

BALTIMORE'S threatened ordinance to **ban** TVRO dish antennas did an unusual twist; an exemption was written in to allow bars and clubs to have TVRO antennas. That was **before** HR 4103 and S 66 were passed, making it clearly illegal for bars and clubs to use TVRO systems for commercial display of satellite video signals not authorized to the users.

LONG space missions (such as 30 days) cause potential personnel problems; NASA is working on system to improve the 'taste' of food and the 'smell' of food. Seems space environment deprives Astronauts of taste of food and smell and during long missions Astronauts are less interested in eating than they should be to maintain strength. McDonald's, meanwhile, wants to send 50,000,000,000th hamburger into space as a promotion and have it eaten there by Space Shuttle Astronauts.

LOS Angeles Times publication, which banned advertising for TVROs, may be coming around. Newspaper, owned by major cable television system owner Times Mirror, apparently is somewhat persuaded by the recent passage of HR 4103 and S 66. No final decision yet.

INTELSAT still 'burned' by FCC rapid approval to Ted Turner to take direct Gorizont feeds of Russian 'Friendship Games' this past summer. Intelsat says US approval played into 'Russian plans to make Intersputnik system competitive to Intelsat' and went on to claim 'Intelsat cannot compete with state run and state subsidized system'. Turner was not only user of Gorizont for games coverage; CBS bought 70 minutes of time and Brazil nearly 900 minutes.

COMSAT has signed contract to give technical and operational advice to Peoples Republic of China for their planned 12 GHz 'DBS' (or 'PBS- People's Broadcasting Service'). China has two options for lifting the system including their own recently developed launch vehicle, or, their 'back-up' reservations for Ariane in 1987/88.

HBO 'hopes' to deliver VideoCypher II version descramblers to 'all affiliates' by end of this year and claims they will have all of the HBO and Cinemax feeds scrambled by the end of 1985. Program has dragged on for more than three years to date and has repeatedly missed earlier announced target dates. Scrambling testing on TR3 of G1 continues.

ANNOUNCEMENT that HBO has begun taking delivery on 10,000 of the VideoCypher II generation descramblers, meanwhile, at $400 region each. HBO will use no fewer than 5,400 descramblers for HBO affiliates and 2,100 for Cinemax affiliates.

ARIANE launch facility has closed books for reservations through end of 1986. Operators say all scheduled flights are now booked and any new customers will have to wait until 1987 or later to get into orbit.

DALLAS STTI show goers may have opportunity to see first equipment from major Japanese player; **Panasonic.** Japanese firm expected to show three levels of 4 GHz C band hardware. Firm has been in our industry previously, appearing at Anaheim (Ca) November of 1981 show to participate in integrated circuit hardware display.

VOICE of America plan to broadcast directly to listeners from geo-stationary location in 26 MHz band may be tested in 1986-era Space Shuttle flight. VOA planning to spend up to $2M to test system during 86 shuttle flight.

SHOWTIME transponder 5 on Galaxy 1 appears to be 'weakest of lot' in otherwise good bird coverage pattern. **Reports** are welcome to **CSD.**

EXPECT some serious changes in GOES weather satellite plan-

TRANSPONDER WATCH/ continues on page 68

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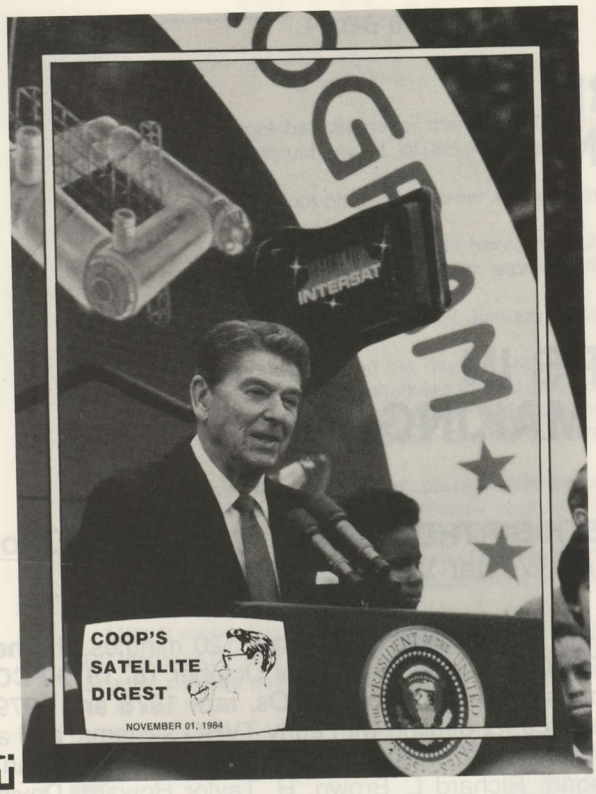

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TRANSPONDER WATCH/ continued from page 64

ning. Government officials plainly upset that recent bird failures caught weather people with no backup capacity. Presently, systems are operating at about 50% of desired capacity and greatest losses are in areas of Pacific storm fronts (two days warning time lost) and tracking of cloud mass **movement** in tropics and sub-tropics (affecting hurricane warning areas).

FARMERS are getting new attention with a number of agri-bird programs planned or underway. **"Family Farm"** debuted October 20 at 8AM (ET) on TR17, Telstar 301. Two hour format brings farmers latest agri-business news, Saturdays, using professional agri-broadcasters and slick format. **ACI** is second player, plans to market TVRO terminals to farmers through farm co-ops supporting on-air program with proceeds from dish sales as well as advertising. ACI is ambitious, hopes to sell and install 130,000 farm terminals in 1985 and will back that up with 6 to 9 hours of farm oriented programming daily plus a 24 hour per day farmer's commodity wire and multi-channel farmer's radio network service. Third player is sticking to radio (audio) service; **Ray Communications** in Richmond (Va) is offering radio stations Agrinet service for use on stations. This project is not intended for direct reception ($7,000 package including antenna for Westar 3 reception).

DECEMBER 14th is last scheduled date for SHOWTIME and The Movie Channel to feed **eastern** affiliates via F3R; after that date, G1 only is planned. Only Showtime west coast (TR10) will continue on F3R bird.

TWO Italian newspapers printed US editions, via satellite, during Olympic games. Copy was transmitted directly to Milan for page make-up and then sent back to US for printing.

M/A-COM LinkAbit seen testing proto-type of third generation scrambling system on TR3 of Galaxy 1; using 'line displacement' technique that produces checkerboard arranged video of tiny squares, dis-assembled by scrambling technique.

ARTS, Arts and Entertainment Channel, will move from Westar 5 to HBO's TR24 on F3R on 1 January.

RADIO Quebec television service will be relayed throughout Quebec on Anik C3 satellite starting 1 January.

MTV will launch a second channel, targeted at 'older' 25-49 age group, on January 1st. This in response to Turner's new CMC service which was scheduled to begin 24 hour per day operation on Galaxy 1 October 26th. Bird and transponder not yet firm.

SPN currently planning testing of 12 GHz package using a pair of uplinks. Marketing directly to hotels and motels is thought to be behind the testing.

JAPANESE attempt to revive either of two ailing transponders on experimental three channel 12 GHz bird failed in mid-September. Bird launched with two operating plus one back-up (spare) transponder. Two of those failed by early in May, shutting down all but NHK national television service. Serious experiments with high definition television and DBS **were** planned.

ATTENTION DEALERS:

If you plan to attend **STTI Dallas** show November 18-20, Coop is looking for approximately 20 'volunteers' to participate in informal, **private** panel discussions to explore new TVRO technology. Premise is that small groups of dealers, numbering up to 8 at a time, will listen to presentations on advanced TVRO product concepts and then 'comment' on the applicability of the product concepts they have learned about and create 'feed back loop' with proposed equipment and service suppliers.

Advance planning is essential and if you meet the following requirements, please call Carol Graba at CSD (305/771-0505) for further information:

1) You must have a minimum of one year in selling TVRO systems from an established retail outlet;
2) You must average no fewer than 10 systems per month at the present time;
3) You must sell equipment from more than a single source (i.e. two or more manufacturers);
4) You must be willing to devote approximately 2 hours of your time for these private sessions on **either** November 18th **or** 19th while attending the Dallas STTI show.

These are 'not sales pitch' sessions; they are designed to bounce off of dealers new concepts in TVRO marketing and you will be asked to agree to signing a 'product/service **non**-disclosure' statement prior to attending the event. This is an exciting opportunity to 'input' on some new product/service concepts **before** they come to market, and, perhaps have a say in how the products/services finally do appear in the marketplace. **Contact Carol Graba today.**

INDUSTRY AT LARGE

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NOT SAFE Over 55 MPH

I wanted to drop a note of appreciation to **CSD** for the assistance I have received from the publication over the past 2-1/2 years. I wanted to do this in Nashville but when Coop was walking by our set-up there a television camera was following him and rolling and I didn't want to impose. We are now marketing a site-survey system which mounts in the back of a pick-up truck. Perhaps some of the **CSD** readers would be interested in it?

Buddy Parker
C.I. Engineering
Route 1, Box 655
Karnack, Texas 75661

The product is called 'Kwik-Sat' **and it gives you a bolt-down mount that fits into a standard truck bed. The user has adjustment over declination and azimuth and in theory you wouldn't even have to be parked on totally level ground** or **pointing in the 'right direction' to make it play. It uses ball bearings for smooth operation and cranks down for travel. It comes with a 4.5 or 6 foot dish package and is priced between $395** (4.5 foot) **and $449** (6 foot). **A good idea.**

ENCRYPTED Religion

CSD has written a great deal lately concerning the LinkAbit and Orion scrambling systems. You might be interested to know that our network (BTN or Baptist Telecommunications Network) will in all probability be the **first** network to use the Oak Orion **Personal Decod-**

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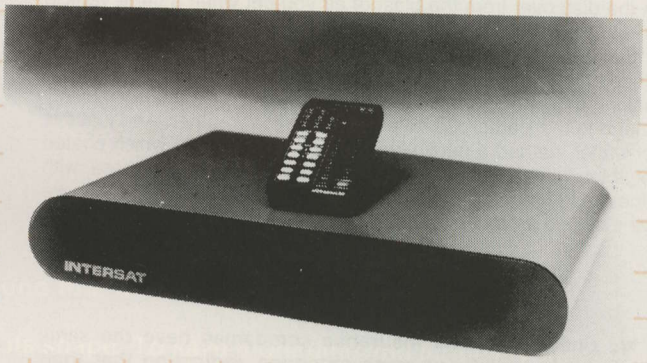

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er with the home market TVRO systems. We have already tested the system using the Canadian CANCOM package as well as our own encryption and we are well pleased with it. Our plans are to begin our SPACENET 1 encryption before November 1st. We expect to have at least 200 Personal decoders in place at that time.

Dan Phillips
The Sunday School Board
Southern Baptist Convention
127 Ninth Avenue, North
Nashville, Tn. 37234

An overloaded schedule prevented us from visiting the BTN uplink in Nashville during the SPACE/STTI show there early in September. We have been working with Oak, recently, testing their Personal Decoder with several of the various receivers in the CSD Lab **using D4 as a signal source. The Oak Personal Decoder line may turn out to be a** 'sleeper' **with an ultimate market penetration far higher than most people anticipate. Oak has been showing real progress of late and for their product line you can at least say** 'they are delivering'; **a statement that you** cannot make **for LinkAbit in the private TVRO world.**

MESH PULLS

Regarding the comments by **John Kaul** in the June 15th issue of **CSD/2,** where he suggests that mesh antennas do not make good trailer mounted installations because the mesh surface will not stand up to the pulled-wind loading. I cannot speak for ALL mesh antennas but I can report on our experience using the **Paraclipse** 12 foot dish which we have been installing since December of 1982. Mr. Kaul stated that he does not believe a mesh antenna would stand up to the wind load when being towed by a trailer. I routinely tow a 12 foot Paraclipse on a specially built trailer at maximum legal highway speeds of 100 Kmh (60 MPH) to demonstrate at locations which are often as much as 125 miles from my office.

I have never had ANY problems in towing nor have I ever done any damage to the 12 foot Paraclipse in towing it. I would, however, hesitate to do the same thing with a 12 foot solid antenna as I feel the first large truck that passed me going in the opposite direction would turn the dish over from the blast of air you get when a large vehicle passes at high speed in the opposite direction.

Kaul also states his belief that mesh antennas will not stand up to the snow loads. My experience is the opposite. We experience severe winters with freezing rain and heavy snows. I have not observed any damage to the Paraclipse antennas from this weather. And just this past winter we had a particularly heavy, freezing rain which coated everything with ice. Hardwood trees broke off all over the area, with diameters to 4" in size. Not one of the many Paraclipse antennas we have installed as a dealer suffered in this storm.

C.E. MacLeod
Maritime Satellite Systems
Sidney, Nova Scotia
Canada BOA 1PO

We understand that insurance companies have the same 'premiums' **for solid** and **mesh antennas, indicating that their actuaries have found no life-cycle differences between the two forms of construction.**

MORE Adverse Press

Enclosed is a newspaper article appearing in the Amarillo Globe News. The highlights are as follows:

1) HBO intends to scramble, not because of TVRO owners but to prevent motels, hotels and apartments from 'stealing' their service and then selling it to their tenants;
2) HBO will allow cable affiliates to sell descramblers to TVRO owners in rural areas, but NOT in franchised cable areas;
3) We are characterized (those of us with a TVRO) as uninformed and unenlightened 'jerks' and 'techo-nerds' (happy grinding of teeth to you too!).

Garry A. Reed
5133 McCarty
Amarillo, Texas 79110

Writer Greg Rohloff **also said** "I don't feel too sorry for anyone caught in the trap which HBO has set; they purchased dishes with the idea that they could get cable for free while the next door neighbor paid for the service. This strikes me as the kind of jerk who would build their own refrigerator from scratch to save $100 . . .". **Apparently it never occurred to Rohloff that at $3,000 for the terminal** (national average selling price these days is just under that number) **it would require 100 months to come out** 'even' **with a $30 a month cable bill. And that sets aside any upkeep required for the system. The longest term financing we know of in our industry is seven years or 84 months. No, people are** not **buying TVROs to** 'get cable TV for free'; **quite the contrary, they are buying TVROs because cable is not available, or in suburban settings, because cable's** "choice" **is far more** limited **than the choice one finds on satellite. Now that the United States Congress has given us their** 'stamp of approval', **dealers would do well to immediately launch into local advertising programs to let the Rohloff's of the world** (as well as prospective customers) **that 'TVRO is completely legal' and it represents the most modern home entertainment 'system' choice in the marketplace.**

73% Efficiency?

In response to a letter appearing in **CSD** for September 01, 1984, where the writer questions the advertising claims for a 73% efficient antenna from a DH antenna. I sent an antenna to Taylor Howard for test. I flew out and really enjoyed the testing sequence with the 73% efficiency results. I also object to writer Jung's characterization that DH stands for 'Design Homes/ a manufacturer of low cost homes'! For the past 19 years we have developed a reputation as a manufacturer of "the most expensive homes . . . but worth the money!".

Franklin A. Weeks
President
Design Homes, Inc.
Prairie du Chien, Wi. 53821

Howard's Chaparral test facility is frequently utilized by manufacturers of TVRO (small dish) **antennas to determine antenna efficiency as well as the proper feed system for such antennas. Perhaps it would be interesting to take the very same antenna to several antenna test ranges, in succession, to see how different ranges measure the efficiency of the same antenna.**

CHAIN Saw Engineering

The Nashville '5th Birthday Party' was terrific; the best birthday celebration I can recall! The program was outstanding and I thoroughly enjoyed participating. The entire event enriched my appreciation for the people and history of this wonderful industry. Thank you for initiating the concept and especially for the opportunity to be a part of it.

I wonder how you might feel about a nomination of Mac Federic as a Pioneer? If it is appropriate for me to do so, I would like to suggest Mac as a candidate. I believe Mac, who has had his ups and downs, can be credited with a major shot in the marketing arm of the industry with the strong advertising National Microtech did and its introduction of the X-9 antenna. I was there when Mac took a chain saw and cut a 10′ antenna into a 9′ square so it could be shipped as a single piece in an 18 wheeler. Engineers at the time said it could not be done but Mac did it and then supported it with a $60,000 per month advertising program, giving the industry a good kick in sales.

Ed Meek
Satellite TV Opportunities Magazine
1717 E. University Avenue
Oxford, Ms. 38655

It would seem more appropriate to remember Mac and Horton Townes for their contribution to TVRO growth by recalling that their National Microtech launched the industry's present distribution system than to remember that Mac got mad at antenna shipping problems and solved those problems with a chain saw! **On the other hand, it would be much more** fun **to create a caricature of Mac for the award showing him wide eyed and hell bent on election attacking a stack of 10 foot antennas with a chain saw!** (Dr. Ed Meek, Lloyd Covens of **Channel Guide,** Coop and others have agreed to serve as a publisher's committee to select nominees for the 1985 Nashville "Pioneer's Award Program.")

CORRESPONDENCE/ continues on page 74

ODOM.
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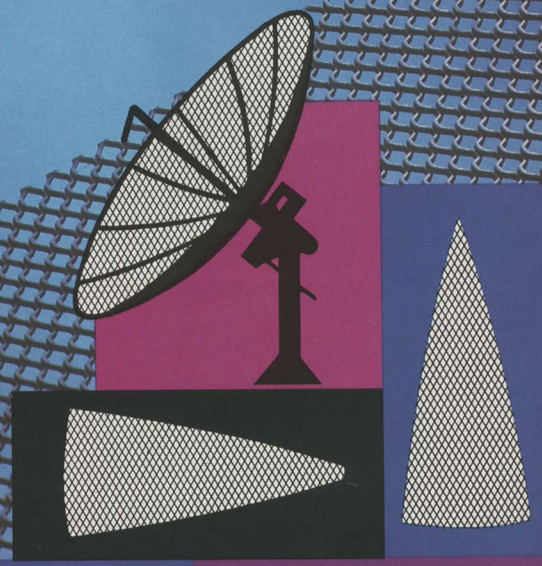

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CORRESPONDENCE/ continued from page 70

MORE Birthday Party Kudos

Thank you for your efforts in putting together TVRO's 5th Birthday Party. The time, thought and research put into the party reflected a job well done and is greatly appreciated by all of us in the industry. I am grateful for having been included in the event celebration. Please pass my gratitude on to all of those who assisted in this event!

David R. McClaskey
Executive Vice President
Intersat Corporation
1000 Lake St. Louis Blvd.
Lake St. Louis, Mo. 63367

No doubt, the party will be recalled on its own merits as a part of our industry's 'early years'. **We had only** one **negative comment following the party program and that came from a publisher who told us it was a** very poor example of self gratification. **The same individual had been asked to participate on stage, along with Dr. Ed Meek and Lloyd Covens but declined. Perhaps we'll have his support in 1985.**

HONOURED

Joni and I would like to thank whomever nominated and selected us for a 'Pioneer Award' at the Nashville SPACE-STTI show. We have always been thrilled just to be a part of it all and to rub shoulders with the people we love and admire. But, to have our industry honour us in such a way is indeed a memory we will cherish forever.

David Brough
President
Commander Satellite Systems
4369 Rathkeale
Mississauga, Ontario

Readers will please note that 'Joanie' **is spelled** 'Joni' **at the Brough household.**

THE TRUTH Hurts

Earlier this year as we were beginning to make a marketplace impact on the TVRO world here in the Honolulu area, we were surprised one day to hear from a potential client that our home TVRO systems were illegal. He then provided us with a letter which he had received from **Oceanic Cablevision,** one of the largest cable firm operators in the US and certainly the largest in Hawaii. I enclose that letter for your comment:

'Recently, several companies have begun to market various systems in Hawaii which will intercept satellite signals for 'free.' We want to make you aware of the fact that this is a violation of Federal Law. Enclosed are excerpts from applicable statutes pertinent to this matter.

'Oceanic Cablevision is legally licensed to distribute satellite signals within our franchised area of operations. Presently we have three (3) satellite dishes, each of which is capable of receiving programming carried on one satellite. As more satellites become available to Hawaii, additional dishes will be constructed so that we can continue to offer the widest variety of programming possible.

'Major suppliers such as Home Box Office and Cinemax will soon begin scrambling their satellite signals. This action will render all unathorized satellite receive dishes unusable. In cooperation with our programming suppliers, we are pursuing our legal rights in this matter. If you have any questions, we will be most happy to talk with you.'

Their letter, sent to many people, was signed by Tim Evard, their Vice President of Marketing. Their attachments cite Section 605 and further notes the case brought by the National Football League against several bars in South Florida in the fall of 1983. The bars lost. They also cite an FCC notice that tells licensees of the FCC that only authorized people are to receive authorized transmissions. They also cite section 106 of the 1976 Copyright Act and note that there is a fine of $10,000 per infringement and $50,000 for willful violation of the copyright act.

Bob Campbell
Starfire Satellite Systems
Honolulu, Hawaii

First note that the letter was written and created by the 'marketing department' **of Oceanic;** not **their legal department. That tells you that the guys in** marketing **are the ones that feel comfortable** mis-quoting **their citations, not the guys 'in legal.' Next, the citations pertain to situations where people were caught intercepting** and selling **satellite services. A** privately **used system, or even a** non-profitable shared-cost system **was not involved in any of the citations** (because there have been **no cases** yet brought against any such systems). **We have to repeat** Rick Brown **on this one.** "To date, no court action has ever been brought in any court against any private terminal owner viewer."

STEPPING Stones?

My wife recently located a 1920 edition of **'Collier's Wonder Book'** in a flea market. Inside I found a pair of articles that may have given the shoulders for Arthur C. Clarke to step upon. I wish I could do something original, but somebody always seems to be ahead of me!

Isaac S. Blonder
Chairman of the Board
Blonder-Tongue Labs, Inc.
One Jake Brown Road
Old Bridge, N.J. 08857

Ike's two articles are entitled 'Hurling A Man To The Moon' **and** 'Hitting The Moon With A Rocket.' **In one, a Professor Goddard of Clarke College in Worcester, Massachusetts suggests that stepped gunpowder charges, starting off with a** big bang **to give initial thrust, dropping that part of the rocket and then firing another charge with a second** (smaller) **portion of the rocket, could create sufficient force to break a space traveling machine away from gravity and hurl it towards the moon. This is all relevant** if **you are into the early studies directed at launching** 'rockets' **to clear the earth's gravitational field. It is only slightly incredible, as we sit at home with 100 satellite delivered TV channels to select from, that a mere** 64 years ago **the world's best scientists were talking about traveling away from earth, and to the moon, using oversized guns and** 'bullets' **as traveling equipment. In the second piece, writers** Waldemar Kaempffert **and** A.J. Lorraine **wanted to launch a trip to the moon from the north pole since** they **believed it would be easier to** 'fall off' **the** top **of the earth than the middle. They, of course, were 180 degrees** 'out'; **witness today's attempts to launch from as close** to the equator **as possible to take advantage of the earth's own rotational speed at its circumference. Those with an interest in learning all about the pre-satellite days would do well to locate both of the new** (May/ June) Arthur C. Clarke **books now on sale at leading bookstores.** "Ascent To Orbit" **tells the true story of Clarke's work leading up to, and beyond, his paper creation of man-made satellites launched into space.** "1984: Spring/ A Choice of Futures" **focuses on the sure pathway to destruction mankind is following if it does not get a firm control on the urge to blow the globe up. Both are excellent reading and an astute reader will recognize several TVRO industry names in** 'Ascent . . .' **including Paradigm's** Johnson, **ADM's** Gowen, **Hero's** Behar **and of course** Coop. **B. Dalton bookstores have both new editions in stock.**

COOP/ continued from page 5

the sequence of events transpired in any order you wish. I was tempted, more than once, to 're-arrange history' but stood strong in the face of temptation.

We had booked into Post-Masters for the 7 PM to 3 AM shift starting on the 4th of October. I arrived in Nashville via Tulsa, St. Louis and Poplar Bluff and by 3 AM on the **5th** was quite exhausted. At that point we were at the 36 minute point in a 120 minute show. There are no rules of thumb in this field; it might take you 10x real time or 100x real time to create each minute of final program. You hope that it is closer to 10x than 100x of course.

The program, at those type time and cost ratios, had to serve multiple purposes. **First,** it was to be a nostalgia piece that people like **Taylor Howard** could sit and watch with plea-

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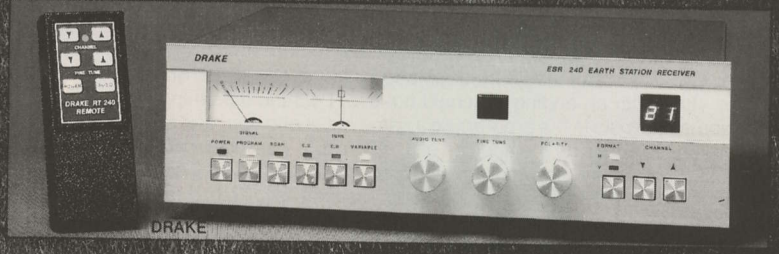

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BILL ROLAND (left) **works out a problem with** Don Hunt **while the Sony 1" machines keep the video moving in the background.**

sure. **That was the 'insider feel.'** Next, it had to be basic enough that total strangers to our business and industry could view it 'cold' and come away thinking they understood both what we do and how we do it; and enjoy having 'learned' our inner workings. It would be nice to have several programs, each slanted at a particular audience but with costs being what they are, that was simply not in the cards.

Finally, it had to be up-beat, capable of sweeping the viewer up in the emotion and excitement of a fantastic, new communications medium. All of those separate disciplines had to come out together and not get in each other's way.

I was presented with one difficult decision just as we were preparing to finish up the final edit session. **Rick Brown** was hopeful that on Tuesday, the 9th of October the **U.S. Senate** would pass new legislation which would essentially legalize home TVRO systems for all time. The week of the final post production, the **U.S. House** had adopted similar legislation. If Senator Goldwater was able to pull off the Senate version on the 9th, the entire future of TVRO would be assured. At that point, 36 minutes into final editing of a 120 minute program, I wanted to finish up the project by 3 AM on the 6th. There was still time to create a **post-script** to tag the end of the program so that when it was shown on satellite on October 18th, it would end with the message that the United States Congress, and the President, had now blessed home TVRO. It seemed like too good an opportunity to pass up. It was also filled with danger since the program would be 'in the can' on the **6th,** essentially telling people what **had happened** on the **9th.** There was at least a slim chance, maybe more than a slim chance, that Goldwater would be unable to pull it off on the 9th and we'd be stuck with an ending we could not use. I did the safe thing; made some final cuts in the program so it came out at one hour and **56** minutes leaving space for the addition of a four minute 'post script' at a later date. In that way the program could be expanded to a full two hours for future use, tying together the Congressional action expected on the 9th with the theme we began with in the first place; the **'Legalization of Home TVROs.'**

While all of this was underway, there was another bit of action following a parallel course in Washington, DC. **President Reagan** was scheduled to appear on the White House lawn around 1:30 PM on October 17th to engage in another form of 'industry blessing.' The **'Young Astronaut Program'** was about to be unveiled.

Those who caught the various evening newscasts on October 17th had surely noticed that President Ronald Reagan was standing alongside an 11 foot TVRO antenna. For the record, the dish was symbolic, not functional, and it was skillfully decorated with an artistic rendering of an Astronaut and the surface of a celestial body. Here is what that was all about.

Some of the President's advisors had been looking for a way to revitalize American youth interest in science, astro-physics and mathematics. It has not gone unnoticed that the present generation of

TWO HALVES/ make a whole. Just days before the President of the United States appeared on the White House lawn to bless our industry and the YAP project, I inspected the artwork going on the dish at Intersat **in their Lake St. Louis facility.**

American youth is largely devoid of the opportunity to participate in national programs designed to push them towards science. In a world moving faster and faster, driven by computers and international video and high speed travel, American youth has lacked the inspiration to become a part of the world of science. Instead, we have multiplied their choices of **diversion** overloading them with more **MTV** channels which are basically mind-drugs. There is a dangerous trend towards allowing American youth to reach the age of 18 with no real interests other than their own pleasure and amusement.

Some bright people in the White House have been working on this problem and the October 17th appearance of President Reagan, on the White House lawn with an 11 foot **Intersat Challenger** TVRO dish, was a symbol of their proposed solution to this problem. It is called 'Young Astronaut Program' or YAP for short.

Here's the idea, and the basic concept outlined by the President on the 17th.

1) NASA will be leasing a full-time video transponder on an RCA satellite; F1R for a **brief** period starting immediately, and **F4** down the road.
2) NASA will coordinate YAP, Inc., which is a non-profit, and non-government foundation designed to bring to American youth a 24 hour per day youth-oriented science and learning channel.
3) Backing YAP (Inc.) are founding corporate sponsors (such as Coca Cola, Commodore Computers, RCA and so on). They are each seeding YAP with $250,000 to get the project 'off the ground,' so to speak.
4) At the local level, TVRO systems will be installed in junior and

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senior high schools to allow the schools to have a direct feed for the YAP channel service. They project a perhaps overly optimistic 20,000 such terminals during 1985 and have a 1992 goal of 110,000 such terminals.

5) On each school 'campus' an educator or a volunteer from the community will serve as the local 'YAP Coordinator/Advisor.' Students will be recruited to join the local 'YAP Chapter' (club) and they will receive membership cards, patches for their clothes and instantly become involved in science learning projects. Commodore, for example, is going to load up the schools with software, through the satellite feed, so the schools will have constantly updated computer programming software for the educators to use.

I instantly liked the concept and put our own resources at the disposal of the project coordinators. During the next 90 to 120 days, all of the final pieces will be falling into place. By early in the spring, I expect to see a very aggressive satellite-aided junior and senior high school extra-curricula national program underway. **As a dealer,** you will have a special part to play because your local junior and senior high schools will be anxious to learn about and become a participant in the YAP system.

Chances are your local school people have already heard about it, from the national news coverage if no other way. **This would be an excellent time for you to be visiting with those educators** and offering to set up a trailer demo rig to pipe the F1R early NASA programs into the schools as a demonstration of what satellite technology and YAP will be all about. I'll have some important details on the project for you next month.

My mind tells me that there was at least some connection between the rapid passage of our industry sponsored legislation and the 'sudden decision' of the White House to back a satellite delivered program for American youth. I am sure that as the White House advisors were checking into the 'legal problems' surrounding the YAP project, they ran into the **Section 605** 'question.' I suspect they also learned that **Senator Goldwater** had introduced legislation into Congress earlier this year to eliminate the 605 problem. The Goldwater legislation, then, provided the White House with a timely solution to '605' and if Goldwater's legislation could be adopted, that would take care of any lingering doubts about the 'legality' of a project that would result in perhaps 110,000 TVRO systems being installed at public and private schools all over North America.

There has been considerable speculation in the past two weeks as to why or perhaps 'how' **our (small) industry** was able to do the impossible; move a bill from introduction to passage during an election year without benefit of even window-dressing 'hearings.' The purpose of hearings is to establish a legislative 'history' or 'record' for new laws. Without hearings, there is seldom debate and without debate there is little public or Congressional awareness.

COMMANDER GENE CERNAN/ the 'last man to walk on the moon' **has served as a science and technology advisor to many White House study groups. Cernan is on the** Board of Directors **for** Intersat **and was instrumental in getting the Young Astronaut Program into high gear.**

It is my judgement that we saw the passage of our 'legalizing legislation' at least in part (perhaps in major part) because we happened to have a solution to a problem that stood in the way of a White House backed project. We were the right people with the right solution and we were in the right place at the right time.

I would like to note that this industry got its first 'legal breath' of air in our lungs on the 18th of October, 1979. And that on the 17th of October, 1984, we were witness to the President of the United States standing in ceremony on the White House lawn with one of the proud symbols of our young industry; a home TVRO antenna. All of this helps us mark our birthday with special significance and to note that just as our **CSD** TV program tried to portray, in five short years we have come a long-long ways indeed.

INCREASED Visibility/ Increased 'Problems'

The merits of HBO's new interest in our industry aside (they have always been 'interested' but they have not always found us 'interesting'), there are several new signs out there that some of the ways we have been acting as an industry (or as isolated practitioners of the TVRO art) are under fire and being challenged in both business and legal forums. I'd like to run down a quick list for you so that you are aware of what some of the new 'threats' to TVRO are these days:

1) The **State of New York,** always a leader in bureaucratic fiat 'protecting the consumer,' has attempted to ban **any and all** TVRO **dealer advertising** in the state. They said they would allow it only if there was a clear warning in the advertising which told consumers that 'use of this system may violate the property rights of others and may violate federal law.' And here you thought only cigarettes were dangerous to your health.
2) The **Los Angeles Times,** a not insignificant publication, has adopted an internal policy outright banning TVRO system advertising. They won't say why, but one has to suspect that since the company is part of a conglomerate which owns substantial cable franchise firms, there is some connection there someplace. People in business don't usually walk away from gross income without some darn, good reason (or darn, **bad reason** if you are a cynic).
3) **HBO** has filed $775,000 law suits against a pair of motels in Wisconsin charging that the motels are pirating Cinemax and HBO service from their private dish installations. Counsel for HBO explains "We are committed, more than ever, to cracking down on the unauthorized use of our program services, **especially by** commercial establishments . . .".
4) A similar suit has been filed in the State of Florida against 17 motels in the vicinity of Orlando, Florida by HBO parent TIME, Inc. The 'charge' is the same although this one was initiated by the cable operating division of Time, Inc. rather than the programming division Home Box.
5) An international **'Copyright Accord,'** written nearly ten years ago in Brussels, Belgium, addressing the matter of 'international pirating of satellite television programming' was headed for consideration by the U.S. Senate. That accord, as ratified by the Senate (even if '10 years late') would have the force of an 'international, binding, treaty' which the U.S. would now be obliged to enforce through whatever legal or diplomatic channels as are available to the government.

There is a 'trend' here which should be obvious to all; those who perceive TVRO to be some sort of economic (or political) threat are finally getting their 'acts together.' Few, if any, of these five 'isolated' examples may be in concert with one another, but the direction each is headed is unmistakable; we have more battles on our hands than ever before!

Arthur C. Clarke sees the satellite revolution as being the greatest evolutionary change in the history of mankind. Others see it the same way. Those of us who have been born and raised in North America have a difficult time even understanding what the 'rhubarb' is about when somebody in Haiti, for example, opts to stick up a dish and tune-in 'foreign' TV programs. We have never had **our** news or

entertainment or public information 'censored' and we cannot identify, easily, with a people who have never had it any other way than 'censored.'

Even in Europe, where 'censorship' is less open, there is a form of 'bureaucratic censorship' that results from state-run broadcasting systems which are self-perpetuating. If you were in charge of the French 'national' television system and everything you worked and lived for was a product of your creativity in a **non-competitive** environment, you would understandably be 'nervous' if some guy named Ted Turner flew over from the United States and announced he was going to give '**your** audience' several new (uncensored) television channels to watch.

Arthur C. Clarke sees the satellite revolution, the technology represented by satellites which 'opens the skies worldwide' to everyone, everywhere, as being so profound that eventually it **will change the world** as nothing before has changed the world. He also sees this as inevitable and suggests that nations with 'thought process' or 'bureaucratic' **censorship** should recognize the 'inevitability of open skies.' In effect, 'relax and enjoy it.'

Few will, of course, and between the ideal world of Arthur C. Clarke's 'Global Village' and the real world of 1984, we have any number of present practitioners of the communications art standing firm ready to 'do battle' with anything and anyone who threatens their turf.

It is not difficult to identify the cause of censorship in Haiti. The political regime in power fears any kind of public forum which offers new, unfiltered 'views' and 'information' to the masses. It is not difficult to identify the cause of 'bureaucratic censorship' in France; one has to but be exposed to a little bit of French broadcasting to understand how totally protectionist the system is for France **and** the French language.

It is more difficult, even though we were raised and live **here,** to identify the opposition to TVRO in the states. That's because our own economic system is based upon **economic advantage** rather than political or national advantage and it is usually more difficult to identify the players in an economic 'game' than in a political game. We have been taught that America is the land of opportunity and we usually end our schooling on that subject just prior to the final chapter where we **should have learned** that economic advantage is for those who have the money and power to make the most of that advantage; that economic advantage often results from little discussed and little reported 'political advantage.' As the sign on the wall reads, **'Those Who Have The Gold . . . Make The Rules'!**

HBO has the gold; the Los Angeles Times has 'the gold.' The movie industry (they would be the primary beneficiaries of the U.S. Senate finally adopting the Brussels Copyright Convention, something **CSD** wrote about at great length in April of 1981) has 'the gold.' TVRO, yet, does not have the gold. But we are working on it.

All of this, and many more examples that could be cited as well, comes at a time when TVRO's legitimacy is less and less in doubt. Our first five years were spent under a dark cloud of possible illegitimacy. Did we really have a 'father and a mother' or did we hatch under a rock in Oklahoma? It has been the efforts of SPACE and Counsel Rick Brown which has turned the tide on this issue; the so-called 'Viewing Rights Bill(s)' introduced in both houses this past March.

There is a basic law in most civilized regions of the world that those who get 'there' first have certain 'squatter's rights.' The first 650,000 or so TVROs (i.e. those now in place) have whatever rights as may ultimately fall to 'squatters' in our industry. There is no 'basic law' in place for TVRO and the "squatter's rights," if any, have yet to be determined.

Which brings us to the efforts now focusing through SPACE. There has been a significant change in direction in SPACE, in my estimation, during the past several months. There is healthy change here which encourages widespread support for their day to day efforts. I have not always been vocal in my support of SPACE, in recent times. **I am now** and **urge you,** as a dealer or distributor or manufacturer to get involved with your dollars and your time in SOME form of SPACE activity. **At the very least,** every member of the industry should now be supporting SPACE with their membership dues. At the dealer level, the $95 per year is not a back breaker and this support finds its way into budgeted items that include dealer defense in cases that affect you directly; Starlink in Wichita, as one example. By denying SPACE

your dollar participation at this time you are hurting no-one but yourself and the future stability of **your own** business activities.

As a distributor or OEM, there are two different levels for dollar participation and while the $300 per month for full Pioneer status is steep for a newcomer, it should not deter any established supplier in the industry. That $300 per month is like having a full legal staff 'on retainer' for what, in the legal world, amounts to an insignificant amount of money per month. A distributor or OEM who has entered our business without taking the precaution of having experienced legal counsel available 'with a phone call' is foolish indeed.

Several people have worked very hard, and have made personal as well as business sacrifices this past year to get SPACE turned around. That objective is largely at hand and sitting out the transition period any longer is a poor decision when our adversaries are busy collecting their own bucks and planning our future for us. If I had the opportunity to meet with each and every non-supporter of SPACE, privately, I believe I could turn the majority of them into SPACE supporters. I don't have that opportunity so why not save both of us alot of time and just get off your rear end and do what you should have done a few months back; join up with SPACE and sleep a little easier at night knowing that somebody is watching your rear quarters while you are busy trying to make your business grow.

REVISITING/USS-Maspro Receiver(s)

In our March 15th edition of **CSD/2,** we reported on our tests conducted on the **United Satellite Systems** (USS) Maspro SR-2 receiver. We documented the performance and noted that the receiver was one of the top performers in the field and suggested that in the video quality department it was **the best** we had quantified.

That review was something of a disappointment to USS's Doug Dehnert who felt we had not given the receiver an adequate 'ultimate-sensitivity' test. Doug and I discussed this at some length, and while I visited their facility in northern Minnesota in mid-May of this past spring, we did some additional testing. Doug was hung up on whether or not it was **possible** to achieve **a true static threshold** of 8 dB with **any receiver** in our field today, without sacrificing video quality.

As he wrote recently in **CSD/2** (Feedback; August 15th edition), he had never been able to measure a 'true 8 dB static threshold' on ANY of the many receivers in the marketplace inspite of advertised claims to the contrary. That, woefully, included his own SR-2 series. It plainly bothered Dehnert that firms were advertising a performance figure which they could not achieve in real world testing. He was tempted to join the 'mis-representations' with his own advertising but being the kind of straight guy he is, decided a better course of action would be to find out why his (and other receivers) would not achieve such a threshold of performance.

For the uninitiated, 'receiver threshold' is a magic measurement point. It tells the receiver designer or tester at what point the receiver quits producing high quality, essentially noise or impulse free video and starts producing pictures which have sparklies. The sparklies don't actually suddenly show up **at** the threshold point; they begin 'earlier' than this especially in the so-called saturated colors such as bright red and blue. You can see the little dots or dashes in bright reds as much as 2 dB 'ahead of' threshold in most receivers. Still, threshold is a hard measurement number (if done properly) and it should mean something if everyone plays by the same rules. The definition of threshold is well understood and easily measured so one would think there would not be much confusion in this area.

There is.

First these facts:

1) Threshold is NOT the point where sparklies begin. It is simply the point where the video signal to noise ratio (something you CAN measure) deviates from the 1 to 1 relationship with carrier to noise ratio (something you can ALSO measure). For example, you have a certain carrier to noise ratio and that carrier to noise ratio (measured) produces a signal to noise ratio as measured in the video output. Let's say for example we have a measured carrier to noise ratio of 12 dB and a measured signal to noise ratio of 50 dB. If the threshold for the receiver is 10 dB, then when the carrier to noise ratio drops to 10 dB (12 minus 2) the video signal to noise ratio now becomes 48 dB (50 minus **the same** 2). If the 10 dB **is the threshold,** when we drop

SR-2 BY USS/ and Maspro (top unit) **stacked with the new SSP-1 stereo processor from the same firm. One parts change inside brought the threshold 1 dB closer to perfection.**

another dB in carrier to noise ratio (to 9 from 10), we measure the video signal to noise ratio and discover that the video signal to noise is now 46 dB; **a 2 dB loss** in video SNR when the carrier to noise loss was but 1 dB.

That's threshold; the point where the video signal to noise deviates from a 1 to 1 (1 dB for 1 dB) change from carrier to noise.

2) Sparklies can begin 1 or 2 or even 3 dB higher than threshold. If threshold is 10 dB we can reasonably expect to see some 'sparklie hits' at a carrier to noise ratio of 11 or 12 dB, especially in the bright or saturated colors.

3) You can measure threshold at static video (color bars) or in moving video (programming). Programming video differs largely in that because the motion on the screen is there, some of the sparklie 'hits' are disguised or masked by the motion. Color bars, static video, is a more threatening test because with everything standing still, the sparklies (which **do move**) stand out more.

Having said that, let's see what Dehnert has done with the SR-2 receivers. He wanted a receiver with a proven ability to produce threshold performance of at least 8 dB and he hoped 7 dB. With moving video that would, he hoped, translate to better weak signal service.

The SR-2 is a very fancy receiver; it is not one of the units that you open up and wonder whether they finished it because the housing is 'empty'. It has the same care and attention to detail you would expect in a top of the line receiver product and we said so in our March 15th review in **CSD/2.**

Dehnert agreed with us, after extensive testing done both in Provo and at the USS facility in Minnesota, that while the SR-2 was **as good as** the best receivers out there for threshold performance, it was not clearly **the best.** Several others were as good. He wanted it better.

From spring until late in the summer, the USS engineers as well as the engineering staff at Maspro in Japan (where the receivers are assembled) fought with this problem or challenge. Late in August they found the answer, at the Minnesota end. They hoped.

Dehnert has zeroed in on a particular section of the receiver within the basic demodulator curcuit. Every SR-2 is checked and certified for performance in Minnesota when they come out of the shipping cartons from Maspro. In that process, they would every now and again stumble across a receiver which had a 1 dB or so lower threshold. That told Dehnert it was **possible** to do what he wanted to do, but nobody could figure out **why** these receivers would be a dB or so better right in with several hundred others that all tested out within a fraction of a dB of being the same. Units that were caught with excellent performance were flagged and held and taken apart. Some were returned to Maspro so they could take them apart there as well. Nobody was having any luck figuring out the cause of the super-performance however and they were about to chalk it up to that numerically possible 'just-right-mix-of-parts' when the solution was found; a single, new

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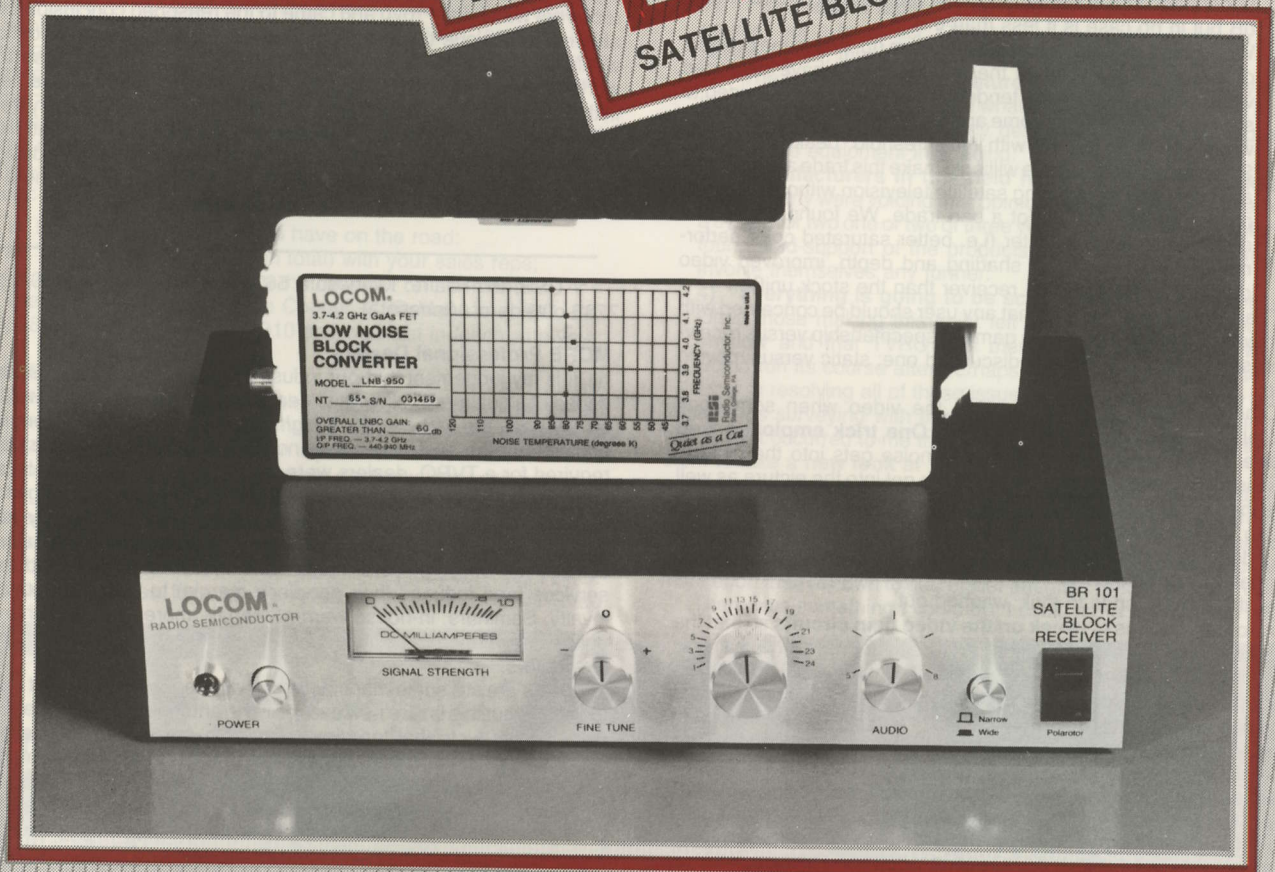

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part, added to the demodulator circuit made **every unit** work with at least a dB improvement in carrier to noise threshold. After 25 of the receivers had been modified and all documented improved performance, a unit was air freighted to the Provo test site so we could do our own test using existing receivers (including an SR-2 'stock') for comparison.

Here is what we found.

1) The modified receiver, as all receivers currently being shipped are modified, does indeed reduce the threshold by 1 dB. I understand that in some cases that reduction is greater than a dB but in no case is it less than this.
2) We worried, prior to hooking the system up, that in the process of lowering the threshold the receiver might have degraded video. There has been a tendency in the past for the video to smear or ring or simply come apart 'at the edges' (edge tearing) when you start to play with the threshold 'peaking' circuits. Some receivers out there willingly make this trade and if people are interested in watching satellite television without regard to picture quality, that is not a bad trade. We found the picture quality actually was better (i.e. better saturated color performance, improved color shading and depth, improved video detail) with the modified receiver than the stock unit.

There are several caveats that any user should be concerned with when we get into the dangerous game of specmanship versus receiver threshold. We have already discussed one; static versus moving video.

Others involve what happens to the video when somebody attempts to reduce the threshold point. **One trick employed** is to **reduce the IF bandwidth** so that less noise gets into the picture. There is also a tendency for less picture to get into the picture as well since the full transponder is typically filled with modulation information to 30 to 34 MHz and if you elect to use a 22 MHz IF bandwidth, some of that video information gets left out of the demodulator. That 'missing information' contributes to video detail (resolution) and when it is gone, the picture tends to look 'washed out'.

Another 'trick' is to **tweek on the video gain circuits** so that the color portion of the signal is either artificially enhanced (resulting in excessive color information) or reduced in strength (resulting in washed out color on top of washed out detail, which is in the black and white portion). Certain receivers have a 'particular video look' to them because design engineers have employed these tricks to get the type of weak signal performance they believe will best sell with small antennas. **You can't have** high definition, high resolution video plus color **AND** also have narrow bandwidths and peaked video circuits. **Something has to give in the process.**

What we found significant in the SR-2 is that none of the bad things one might expect to see are apparent even though the threshold has been 'extended' or reduced. And until somebody comes along and shows me a side by side comparison test with a current run (i.e. modified for threshold extension) SR-2 and some other receiver, I must report that the SR-2 is **the top performer** for both video quality **and** weak signal performance at the present time.

BEST SENSITIVITY and excellent video quality. This is a 31 dBw signal on a 12 foot (Paraclipse) **antenna through the SR-2 receiver. No sparklies, tearing, or jitter.**

Finally, I think USS/Maspro has some protection from being copied by the copycats for awhile because the particular modification they have made to the SR-2 receiver is peculiar to the unique demodulator system they use. I pondered transferring that technology (that's a polite word for copying or pirating!) to some other top performing receivers we had at Provo and came to the reasoned conclusion that absent the unique-to-SR-2 demodulator system, the modification would not integrate with competitive units. This is not one of those 'the world will now change' reports because even with a 1 dB improvement in threshold, you are not suddenly 'home free' with an antenna system that is simply producing too few signal microvolts from the satellite. But it does point up that as all of our products mature, a solid design can be called upon to do more and more for the user and there is always room for tweeking and improvements.

---

*/ USS, St. Hilaire, Minnesota 56754; 218/681-5616 (800/328-7733 outside of Minnesota).

MORE Professional Dealers

It is my judgement that our industry is going through yet another period of adjustment in the retail/dealer selling area. Without dwelling on the past, the first dealers bought directly from the OEM (original equipment manufacturer). Since no OEM produced **all** of the parts required for a TVRO, dealers were forced to 'shop around' to locate everything needed for an installation. Distributors entered the picture and dealers purchased from one or more distributors largely as a matter of convenience. As more and more distributors came along, competition became more intense and distributors increased their services (and reduced their per-piece margin) to try to build dealer loyalty. Seminars, in-house warranty repair, more lenient exchange policies developed because dealers began to expect more from their distributors.

There are still some manufacturers who depend upon direct sales to dealers but this is rare now except in the antenna area. For the most part, the products that 'go direct' anymore are those that are sold regionally rather than nationally, or those that are so new to the market that distribution channels have not yet developed.

During the past year another new development has been the distributor field-sale-force; a team of people, usually hired because of a combination of selling plus 'engineering' skills, who call directly on dealers in their territory on a routine if not scheduled basis.

Putting people on the road, to sell, is hardly a new technique but **it is new to TVRO.** It costs money to do this, of course, but if sales increase significantly, for the distributor, it is the best of many worlds for the dealer. A distributor sales-rep calling on dealers has a tremendous advantage over his competition who can, at best, burn up the 800 number lines calling dealers and asking for orders. A good sales rep can use his one hour visit to demonstrate new equipment and techniques to the dealer, buy him a cup of coffee, perhaps even inspect a 'problem installation' to give the dealer some assistance. This is the best kind of 'salesmanship' and it is also one of the best ways for a dealer to stay up to date on new equipment and techniques.

I've been thinking about the process and have come to the conclusion that these early sales reps, calling on dealers, may be the best **missionary group** this industry has operating today. **And I'd like to help with their work.** Here is part of what I have in mind:

1) **CSD** will shortly begin producing a monthly series of videotapes designed to help dealers better understand the basics of TVRO. I'd like to put a copy of that monthly tape in the travel bag of every industry traveling sales rep, and have the rep show the tape to the dealers he visits. **I'll do this at no charge** (i.e. provide a new tape each month) **if** the sales rep will do one thing for me; **return** the tape at the end of the month (for a copy of the next month's tape) **and** provide **CSD** with a list of the dealers who saw the tape the previous month.

I see the scenario going like this.

"Hi John, I'm back . . . your favorite TVRO sales rep is here again with several new products to show you. And I have the latest dealer training tape from Coop **at** CSD; **this month it's all about protecting equipment against power surges. Which will it be** first; **the new receiver I brought to show you, or, Coop's tape?"**

There are no restrictions here; if a dealer wants to dub our tape, that's fine with us. We (meaning **CSD**) are in the education business and I view this new program as simply another 'medium' for us to use to reach dealers with educational material. The material will, for the most part, be 'timeless'; that is, it will endure for years as long as the mechanics of TVRO does not change rapidly. Most of the pieces will be short (10 to 15 minutes maximum) so as to not require a long viewing session. And, again, it will be **free to the distributors** who want to make use of the material. You find that hard to believe. I suspect, so you are wondering where the fine print comes in **(*).**

The first thing you need to do, if you are a distributor with sales reps on the road, is to drop me a note and ask to be enrolled in the 'CSD Hands-On Dealer Training Program.' Just a letter, outlining the following:

1) How many sales reps you have on the road;
2) The regions you cover (in total) with your sales reps;
3) About how many dealers the reps call on per month.

That's it; drop a note to Bob Cooper, CSD Magazine, P.O. Box 100858, Ft. Lauderdale, Fl. 33310 and we'll get in touch with you.

PHASE Two

Not content to expand our dealer 'outreach program,' I pondered how we might go about attracting more professional sales and service organizations into our retail field. In my recent travels I have made it a point to spend as much time as I can in each city I visit going out and locating the largest electronic sales and service centers in each area. In several months of this activity, I found that more than 80% of these established firms do **not handle** TVRO products and the majority of those I talked with gave me several reasons why they don't sell TVRO.

Getting into Tulsa, for example, with a couple of hours to 'kill' I drag out the yellow pages and check for big display ads from people who sell TV sets, hi-fi sets, refrigerators and so on. Then I call them and ask if they sell TVRO systems. Slightly under 20% said they did. I make this a short conversation and move on. I'm looking for firms that do **NOT sell** TVRO so I can try to determine why. We have a great product going here; why aren't more of these large firms selling TVRO systems?

Here are some of the most often voiced reasons. **Read them carefully;**

1) "TVRO is not legal." That was an opinion (at the time) of course, not a hard fact. Of those who voiced a 'problem' with selling TVRO, this was the most oft repeated 'opinion.'

2) "The equipment is not mature." Many had tried out a system in 1981 or 1982 and didn't like what they saw. I heard a long list of objections that included poorly designed motor drives and not-compatible equipment interfacing.

3) "Manufacturers in this field have no warranty backup." Again, many were voicing this 'opinion' because they had tried out a system or two one or two or three years ago. They had problems, found field-support of the products poor, and were unwilling to involve themselves any further.

4) "Everything is going to be scrambled." Another 'opinion.' Often those making this point felt that cable was 'the medium' anyhow and that TVRO was merely a flash-in-the-pan which would run its course after perhaps 1,000,000 systems or so.

Time is resolving all of these issues. I'm not sure the large retail firms I was surveying with this quick study really realized that fact however. It occurred to me that something needed to be done to get them to take a **new look** at TVRO. One possiblity would be if Congress adopted legislation that clearly stated we were legal (as opposed to there being no hard legislation which said we were not legal). Another possibility would be if the President might somehow bless the industry. My wheels were turning but it was going to take more effort than my own to get retailer attention re-focused on TVRO.

There was something **I** could do; I could try to get to these retail

operators with something I knew they paid some attention to, such as a magazine which goes into virtually every service shop in the country. Now, **which** magazine might that be?

The November (1984) issue of **Radio Electronics Magazine** begins an initial series of 12 (monthly) columns which I am writing for this publication. Radio Electronics is the oldest electronics publication in North America, having been started by **Hugo Gernsback** back more than 75 years ago. Its name has changed a few times but its leadership and direction has remained on course from the early spark-gap transmitters to the present day laser disc technology. I have a particular fond place in my heart for Radio Electronics since I did an alternate-month regular column for them starting in 1957 (through 1960). R-E had also published my multi-part series describing the construction of a home TVRO system, back early in 1979, and their publication of that series (later to be re-printed as a book) had played a significant part in reaching people in the electronics business and launching this industry. **Now I would be back with Gernsback,** again; at least for a year.

I don't need any additional writing 'assignments.' But our industry needs to grow into the more consumer oriented world of retailing and we have to reach some of the larger retailers to get the next growth phase underway. By conducting a regular 'column' for TVRO sales and service in Radio Electronics, I might be able to focus some new retailer attention on TVRO. It was worth a shot.

I told the folks at Radio Electronics I didn't wish to be paid for the monthly column; I had but one request. I asked for (and received) their permission to place an announcement in the monthly column which would encourage sales and service centers NOT handling TVRO to write into **CSD** to request a FREE information package describing the 1984 TVRO business. In other words, I wanted first shot at convincing these retail and service centers that they should seriously consider retailing TVRO in 1985.

So far I'm **not getting paid** for writing the column and I'm **giving away free** information packets. A poor business decision? Perhaps.

Then I went to some of the suppliers in our industry and I asked them how they would like to include their latest catalog or product data sheets into these free packets which our mailing service was going to process. I wanted to get as much data about TVRO (my own and that of others) into the hands of these potential new TVRO dealers as possible. I offered to take that a step further; after each month's requests had been handled, **CSD** would supply a **computerized mailing list** of those firms and individuals who had written for the free data packets to each of our industry firms that supplied the package-stuffer literature. In effect, CSD sends out the first batch of data and then the OEMs and distributors participating get the names for their own follow-up mailings.

Response, to date, **has been excellent.** I expect we will be shipping out 3 and 4 pound 'information packets' by the time we get to January; several hundred per month to serious, operating, retail and service centers already in the electronics business.

I am doing this because I want to see the next growth phase of retailing get started with a 'bang.' **If we wait** for all of those thousands of established retailing firms and service firms out there to discover TVRO **on their own,** we might be another 18 months or more before we are **routinely** clipping along at 50,000-75,000 terminals per month. But **we can speed that up some** by getting these firms interested **right now** and that's my contribution to our growth.

Oh yes. If we have somehow missed you, as an OEM or distributor, to date with our explanation of how the 'information packet' program works, **and you think you might like to participate,** why not pick up the telephone and give Carol Graba a call. We do all of the work, you provide us with data or catalog sheets, and then we complete the cycle by providing you with a computer print-out listing of every firm that requests the data packets. You pay a nominal share of the shipping and handling charges and we all reap the benefits. **CSD** might even get a few thousand new subscriptions out of it. Give Carol a call, today.

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*/ This offer is good for distributors (or OEMs with field sales forces) who are routinely advertising in **CSD.** That's the only re-

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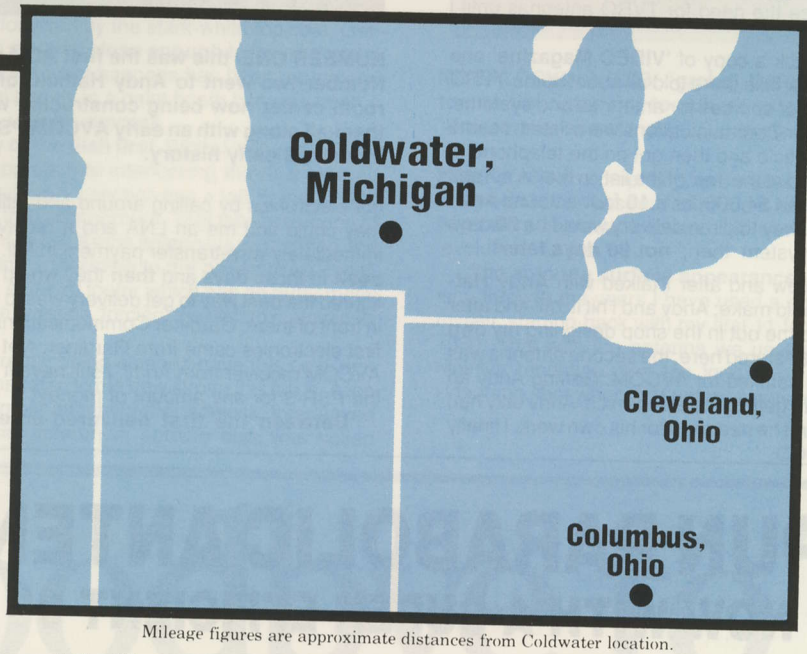

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quirement; be a **CSD** advertiser on a monthly basis and we'll supply your field sales people with **free** dealer training tapes each month.

ADM/ First In Line

"Andy Hatfield and I sat on the telephone one day late in 1979 trying to name this company," recalls Jamie Gowen. "Andy suggested I should select a name which started with the letter **'A'** so that I would always be listed first in any directory; that's where ADM came from!". It may have been a 'moot point' in 1979; ADM was **'first'** because they were the **only firm** manufacturing home style TVRO antennas. They were also 'first' because their antennas were less than half the price of the then-available commercial style antennas. Jamie remembers how it all started.

"We operated a metal fabrication company here in Poplar Bluff. And I was always looking for products we could manufacture here to expand our product line. At the time TVRO antennas came along, we were building old-style wood burning stoves and steel tanks for fuel and the like. But I didn't realize the need for TVRO antennas until I talked with Andy Hatfield.

"Somebody brought me back a copy of **'VIDEO Magazine'** one day in mid-October (1979). An article there told all about home TVRO systems and it listed a number of sources for antennas and systems. Firms such as Andrew, Gardiner Communications were listed. I came home for lunch and read the article and then got on the telephone to call people in the listing. I started at the 'top' of the list, in the "A's," and called Andrew first. They wanted $4,000 for a 10 foot antenna **and I would have bought it** except they told me delivery would be 90 days or more. I wanted a satellite system 'then,' **not 90 days later!**

"AVCOM was below Andrew and after I talked with **Andy Hatfield,** that was the last call I would make; Andy and I hit it 'off' and after several four hour calls, he had me out in the shop designing my own antenna. The first antenna is still stored here; the second antenna was taken to Richmond (Va.) and installed for AVCOM. Getting Andy an antenna was far easier than him getting me electronics. Andy only had a **single receiver** at the time and he needed it for his own work. I finally got electronics by calling around and telling people that as soon as they could find me an LNA and a receiver, to call me and I would immediately wire-transfer payment in full. Everyone wanted your **deposit** in those days and **then** they would put you on a 'waiting list.' I figured the best way to get delivery was to dangle full, instant payment in front of them. Gardiner Communications came through first and my first electronics came from Gardiner. Not too long after that, I got an AVCOM receiver from Andy. I still have it here and wouldn't part with the PSR-3 for any amount of money!"

NUMBER ONE/ this was the first ADM antenna Jamie ever built. Number two went to Andy Hatfield of AVCOM. A new display room center now being constructed will 'show off' **this first-of-them-all along with an early AVCOM PSR-3 receiver; some of our industry's early history.**

Between the first delivered-antenna, to AVCOM early in

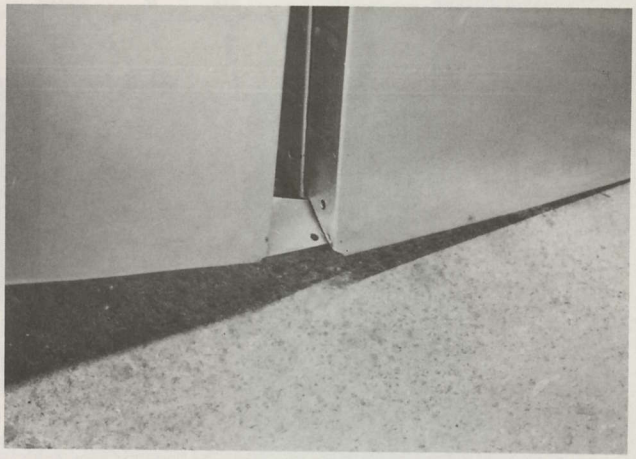
November (1979), and the industry's second (SPTS) show in Miami early in February, ADM shipped between 75 and 100 antennas. That made ADM the largest single antenna producer to the TVRO industry at the time. They would retain that position for at least another 18 months.

ADM's antenna line extends from 10 feet to 20 feet with way-stops at 11, 13 and 16. There has been a constant evolution of the products from day-one and Jamie Gowen is never totally satisfied with any design. "We can always do it better and we are constantly learning from our mistakes," he suggests. The concentration these days is in two areas:

1) The individual panels, fully-parabolic for more than a year now, needed to 'inter-lock' around the outer rim. Ideally, if the panels could lock together at the rim or circumference, in a precise manner, the parabolic curve accuracy would be assured all the way back to the center of the dish.
2) The dish finish, both the look and the durability, needed to be improved. In the past, dealers have not always been pleased with the Zinc primer followed by the stark-white top coat. Getting metal (aluminum or steel) **clean enough** to insure that the paint will stick no matter what happens has been a problem. Painting up individual panels in a paint booth has also been a slow and not always uniform process.

The structural integrity of the dish first. While I was visiting with ADM I was shown a new approach to interlocking the rims on their popular 10 foot antenna; each panel section has a tab or metal stub which protrudes from one of the outer corners. That tab is designed to compress-fit into the adjacent panel. As the antenna is assembled, the tab becomes a part of the rim, connecting to the neighboring panel. The concept grew out of the ADM 20 footer which has an outer metal 'band' which circles the entire antenna 'forcing' the dish to maintain its parabolic curve.

All of the ten-footers currently being shipped have this new 'rim-lock' system and they demonstrated to me how strong this tab is. A ten footer was assembled by simply attaching the 'rim-lock' interleaved tabs around the antenna circumference; nothing else was bolted together. When completed, two men could lift the entire antenna off the ground as an assembled product and it held together as if **all** of the bolts were in place. It looked like a winning idea, a nifty product of 'evolution,' to me.



INTERLOCKING TAB/ 'grabs' the adjacent panel section and forces the outer rim to adhere to a locked-in parabolic shape. 'One small piece of metal . . . one giant step for antenna-kind . . .'.

The antenna surface appearance. I was familiar with that problem; through the years I have used a dozen or more ADM antennas myself, starting back with my first 11 footer installed in Oklahoma in 1980. That was the antenna we used to bring in the first Russian Molniya reception. Not too long ago I had, in fact, reviewed the videotape shot when that antenna was assembled and right there on

COOP/ continues on page 92

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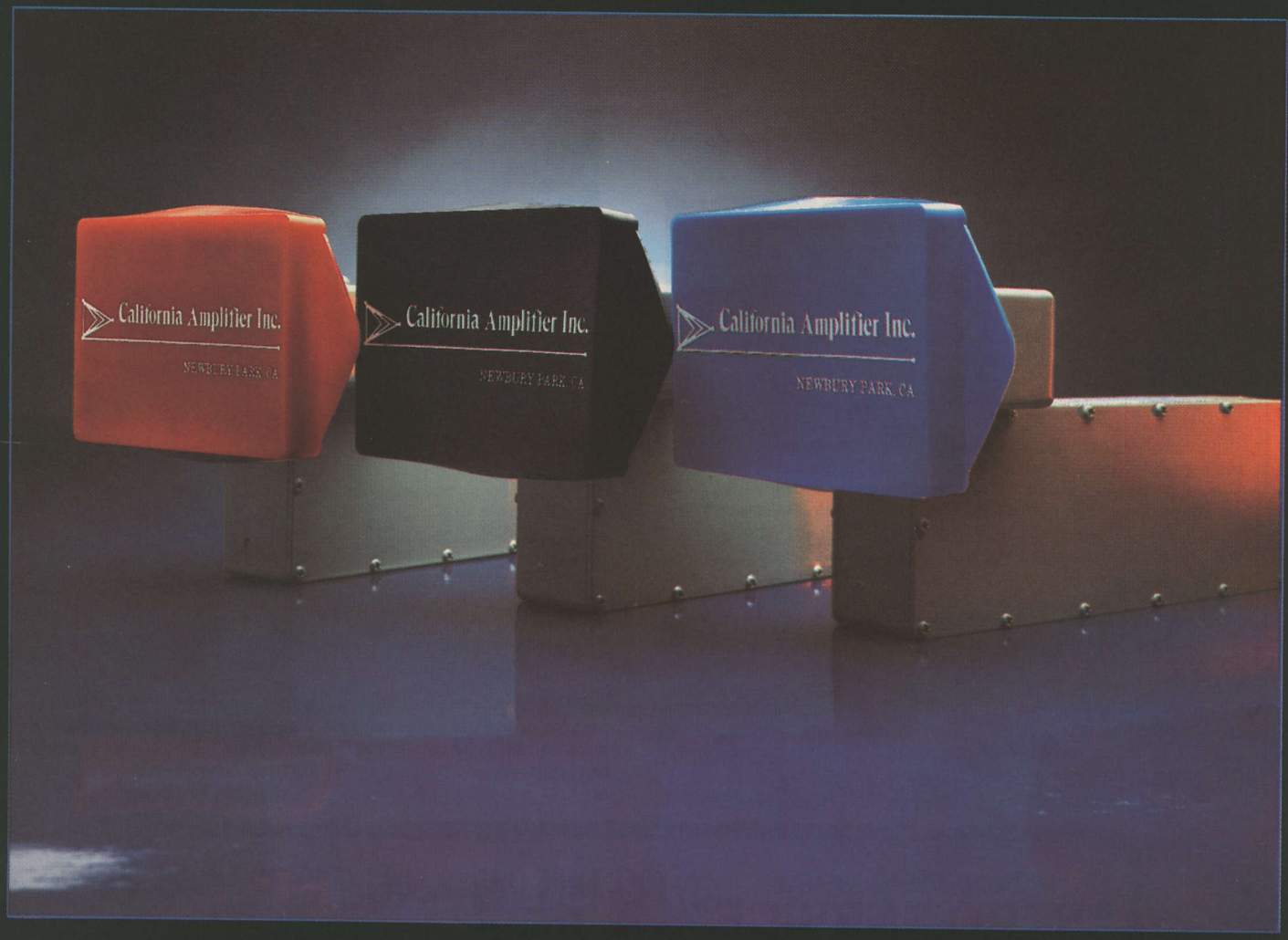

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COOP/ continued from page 89

the tape was a fellow saying, "They may know how to build antennas, but they have more to learn about painting metal!". The light coat of paint was flaking off even as the antenna came out of the shipping carton.

Getting metal clean so paint will adhere **is tough.** Even a slight amount of grease or foreign material on the metal will keep the paint from bonding properly. Through the years ADM has hacked away at the problem but complete success has eluded their efforts. No more.

"This new paint and processing shop can handle more than 100 complete antennas per day," pointed out Gowen as we inspected the new facility. "I designed it so the entire process is automated; antenna panels, mounts, rib supports . . . anything we build for any of our antennas can be placed on the processing line and it travels from one end to the other without being handled by workers. When it comes out the far end, it has been cleaned, primed, dip-painted and dried all automatically!".

A very impressive system; a huge paint vault extending some 12 feet down in the ground holding a couple of thousand gallons of special paint is the 'secret.' The metal parts are placed on an overhead conveyor at the start of the line, as they come into the new building from the metal fabricating plant just across the highway. The conveyor line grabs each metal part and suspends it for the cleaning, priming, painting and drying process. It takes around 40 minutes for a part to circle and as it comes off the line at the far end workers lift the parts from the conveyor line 'hooks' and immediately package the antennas for shipment. Jamie designed the line so that any size parts, for 10, 11, 13, 16 or 20 foot antennas can be run on the line in any combination with any other parts.

"In this way we can maintain stock in all size antennas and mix the products on the line without having to make any changes in the equipment. In fact, we can and routinely do adjust product flow on the line based upon order levels or inventory level-needs."

It has not always been that way and other firms that attempt to

DIPPY DO/ the new automated line can handle any type or size of part for any ADM antenna built. The line moves at a controlled speed so they are dry by the time they get to the end, where they are wrapped and packed for shipping.

maintain an inventory mix for various different sizes of antennas have found that it is difficult to keep a proper balance in inventory at all times. There are usually tooling or production line set-up changes which must be made to switch from 11 footers to 13 footers, for example. **Not at ADM.**

"Our metal stamping and fabricating is done in our original plant which is in a nearby building. Each size antenna has its own dimensioned hub, support and petal fabricating equipment. Raw metal or steel is processed there and inventoried according to antenna size. By keeping a control of the inventory in metal-processed parts, the order input, and the shipping levels, **we start each day** by bringing finished goods inventory back up to some minimum levels. That simply means bringing the appropriate quantity of stamped or fabricated parts from the metal forming facility to the paint and finished goods facility, placing those goods on the automated finish line and running them through."

Before this latest addition (a new 15,000 square foot building just being completed, as I visited) parts had to be **hand** cleaned, primed and painted in a pair of traditional paint booths. We inspected the old facility and it was obvious to me that the new automated system had to be better.

"Can you imagine the tens of thousands of antenna parts that went through here in years gone by?" pondered Gowen. "And everytime we moved the parts, first to clean them, then to prime them, finally to paint them, we had to physically handle the parts. They never got a chance to dry properly and each time they were handled there was the danger of adding new grease or dirt to the metal. This was a real bottleneck!".

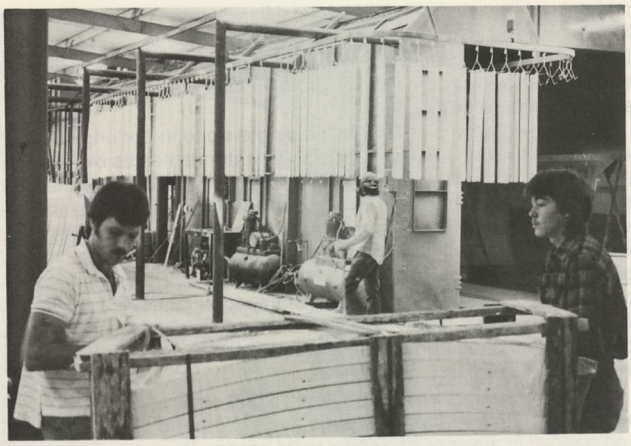
The bottleneck created by the finishing department has perhaps held ADM back when other competitors were automating their facilities. A flat-out month, running multiple shifts, could handle up to 1,200 completed antennas per month. Removing the bottleneck would easily double that production capacity now.

"You will notice there is room here to install a parallel finishing line right next to this one," Jamie pointed out. That meant as their business grows, he is ready with under-roof room to get into the 5,000 antennas-per-month capacity level without any major, new capital expansion.

PANELS ON THE MOVE/ metal antenna panels and parts head into the final stage; cleaning, priming and 'dipping' on the new ADM automated line.

ADM marketing has changed through the years. ADM sold antennas, first, because they were the only game in the country. The antennas worked well (as tests at the infamous Omaha Antenna Shoot-Out would later prove) and they were available. Pricing has stayed 'competitive' through the years, starting off considerably higher than they are today, but in those days each antenna was virtually hand-rolled. Gradually as more and more antennas have been produced, automated steps have crept in so that today the per-piece-cost is a fraction of what it was early in 1980.

Like most antenna producers, they make a special marketing effort in their own backyard. An impressive showroom facility grew up



ANTENNA PARTS are skin wrapped and packaged as they come off the automated line (to rear).

in their front office where potential customers can see and sample satellite TV using a wide variety of electronics (typically Drake, AVCOM, Regency et al). Years ago when nobody else was doing it, they began to service the local market in a 50-75 mile radius of Poplar Bluff. That, today, has become a major part of their operation.

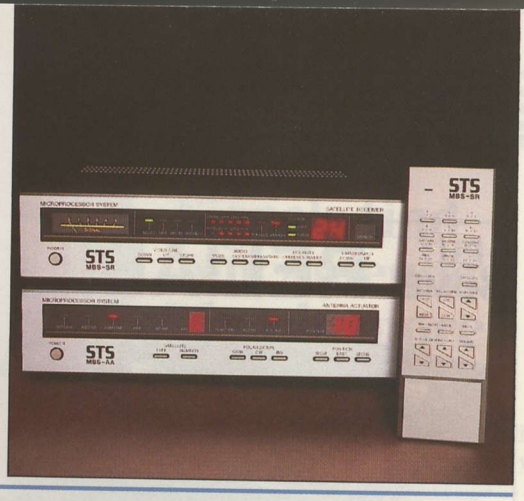
"We keep 48 antenna trailers operating around the clock," points out **Ed Randall.** How they do that is interesting.

"Many people use trailer mounted antennas for demonstrations. We go further than that. We consider each trailer rig to be a combination of a mobile-showroom **plus** an installation tool."

1) Out of the retail showroom, sales are made. Volumes to 50 per week are common.
2) The customer selects the antenna, actuator, receiver and electronics they wish and financial arrangements are made. **Two** prices are quoted; **one** for a complete installation, and **a second** where the customer (using equipment and parts supplied by ADM) installs his own support pipe and agrees to run his own cabling.
3) A trailer mounted antenna, **the antenna** they have selected, is taken to the home and the antenna adjusted to track the belt at that location (by rotating the trailer around). The system stays in this mode typically for three days.
4) The customer has to 'see' the system working in their home for three days; in that three days it is **their responsibility** to dig a hole, and set the pipe support in place. ADM supplies alignment tool 'jigs' to insure that the pipe support goes in straight.
5) The customer calls in, or is called, and he reports he will keep the system and he is ready for moving the antenna from the trailer to the pipe support. A team schedules the move.
6) Following behind the antenna moving team by a couple of hours is a technician who specializes in hooking up the final cabling and tweeking the dish. The customer has agreed to route his own cables and wiring and if they want the cables buried between the pipe mount and the building, they do this themselves.

Our instant reaction was that this was a less-than-complete installation service. Gowen's experience in this area is instructive.

"We knock a significant amount off the price if they will agree to set their own mount, bury and run their own cabling. Ed and I learned early that if **we** had to dig holes and pour concrete, bury cables and then route the cables into and through the house, we were spending several extra hours per installation. It could be far longer than that; often they wanted the cables to come into the house in a certain spot, up through a hollow wall, across the top of a ceiling, down through another wall and then back up through the floor. A man, two men, can spend four hours doing a custom job like that. There is no way you can foresee just how long an install like this will really take. **And on most jobs like this you lose money.** More important, you lose valuable crew time and it messes up your scheduling. We work on volume. **One crew** does nothing but deliver and do initial trailer-set up on antennas.



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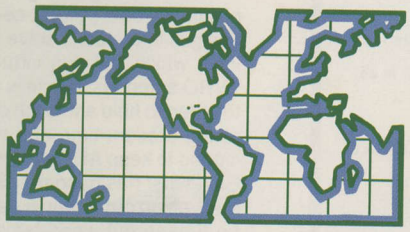

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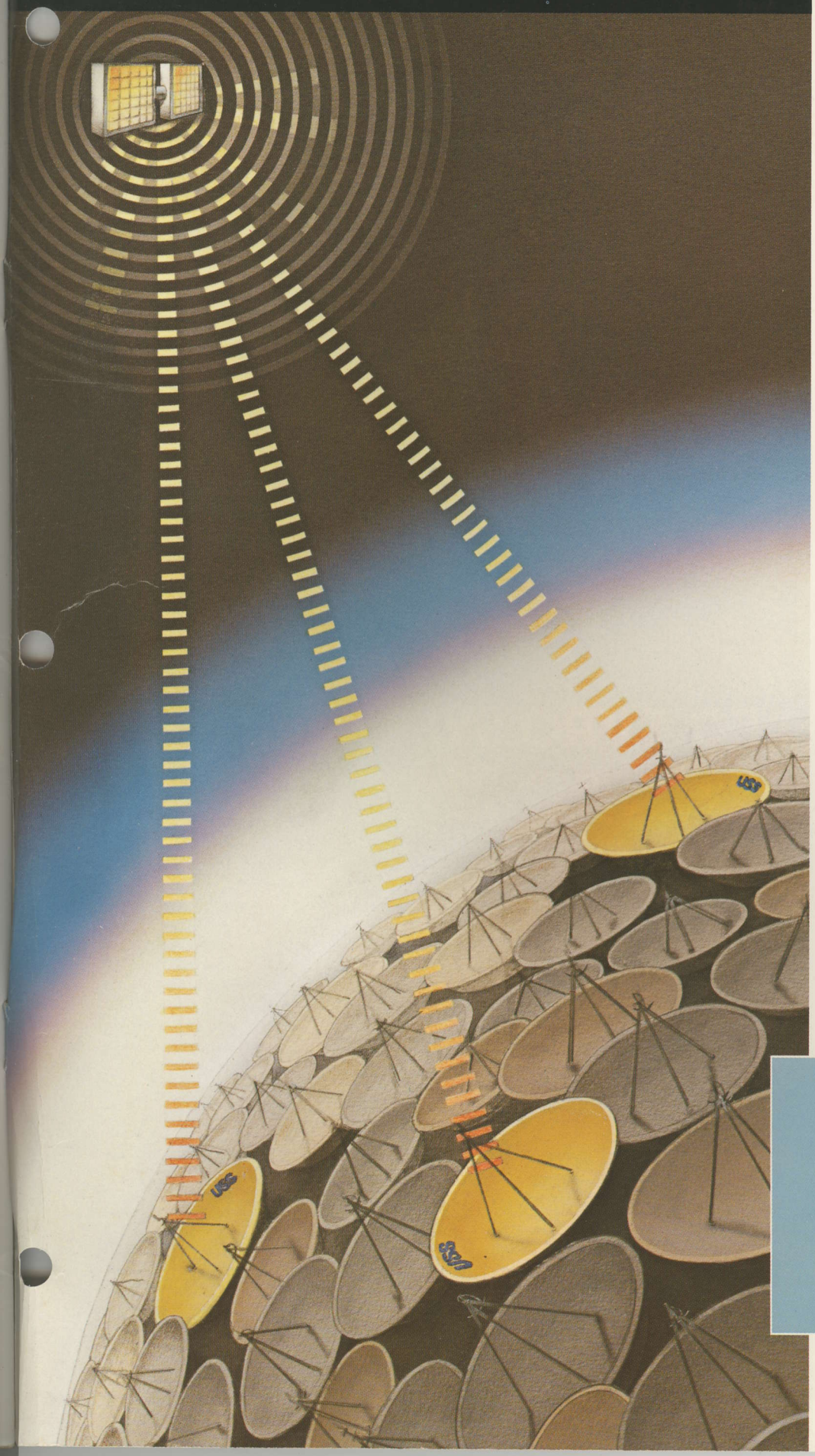
20 FOOTER at 2.1 degrees look angle. ADM wanted me to see their low look angle performance and this is where we found Gorizont from 14 west in southern Missouri. Several people thought the antenna was 'broken' **when they saw it sitting at this low look angle. Yes, we are 'on the ground'!** (Gorizont pictures were excellent, by the way.)

They are very good at what they do because that is all they do, all day long, every day. **Another crew** does nothing but shift antennas from the trailer bed mount to the customer installed pipe mount. We have special equipment for this and we can do many of these per day, in a hurry. **The final visit,** by a technician, does the final wiring hookup and the tweeking. He does nothing but this every day. This makes each step professional because each step is done by people who do nothing else all day long."

It works. In our brief half-day visit we saw several dozen customers come in the front retail facility and a significant number left after placing orders for terminals. When the customers are from an area outside the region comfortably served by the ADM crews, the customers are put in touch with an ADM dealer in the field nearby to where they live. We listened as one couple, from Ohio, told Ed Randall, **"We came here to buy the system because our relatives bought one of your systems and they spoke so highly of you-all."** Randall worked out the system details and selling price by coordinating it with a dealer in Ohio.

From the first ADM antenna(s) in the fall of 1979, designed and built by a young man who got started simply because he wanted decent television reception for his own family, to the modern facility employing upwards of 75 people spread over four sizeable buildings, ADM has managed to grow and adjust to a changing antenna marketplace. We saw several new antenna designs Jamie was working on; designs intended to solve the weight and space (bulk) shipping problems which still dog virtually every producer of 10 foot and larger TVRO antennas. Jamie is an intense young man who works until he is too tired to hold a wrench or run a press. He is on an 'expansion curve' at the present time and has an aggressive program underway designed to keep ADM 'first' in the industry listings and first with dealers. Being first has become a way of life for Jamie Gowen and this is the first year in more than a decade where the Poplar Bluff facility will **not** be turning out wood burning stoves in the 'off-season.' As Randall notes, **"With TVRO as big as it has grown, there is no off season anymore!".**



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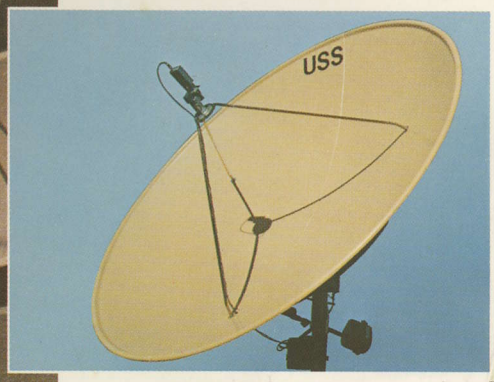

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